Enclosed Belt Conveyor

24” - 60” Models

INSTALLATION & OPERATING INSTRUCTION MANUAL

Manufactured in the U.S.A. by

SWEET®
MANUFACTURING COMPANY

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A minimum charge of Fifty Dollars ($50.00) net, exclusive of transporation charges, will be made on all orders, unless otherwise noted on invoice for the value of such material as less than this amount.

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Enclosed Belt Conveyor

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Purchase Date _____ Model _____

Serial Number_____

INTRODUCTION

The purpose of this Owner's Manual is to advise and instruct owners of Enclosed Belt Conveyors and accessories in the recommended installation, operation and maintenance of the equipment. You have purchased a product which has been manufactured with utmost care and the finest materials, reflecting many years of engineering knowledge.

You now have the task of installing your equipment, either by yourself, under your supervision, or by hiring the work done. Regardless of who does the installation, this manual is designed for you. The instructions and drawings give a step-by-step method of recommended installation procedures. Methods will vary among millwrights, but if you are not sure which is best, we suggest that you follow instructions in this manual.

The following information will aid you in the installation and operation of your new Enclosed Belt Conveyor. To ensure long life and trouble-free operation, you should read these instructions and provide regular, periodic maintenance. IT IS THE INSTALLER'S RESPONSIBILITY TO BE AWARE OF AND COMPLY WITH ALL FEDERAL, STATE AND SAFETY CODES, BUT NOT BE LIMITED TO SAFETY AND ELECTRICAL CODES.

CHECK & INSPECT YOUR ORDER

Each order or shipment is double checked before leaving the factory. All parts, pieces and components are listed item by item on our packing list, which accompanies each order. The number and description of each item, package, container, skid, etc., is listed on the bill of lading. IN SIGNING THE BILL OF LADING, THE CARRIER ASSUMES FULL RESPONSIBILITY FOR SAFE DELIVERY OF ALL GOODS TO DESTINATION IN THE SAME ORDER A CARRIER WAS TENDERED BY THE SHIPPER. In the event of damage or shortage, have the transportation company note the same on the freight bill. You should then file claim against the carrier for such loss and/or damage.

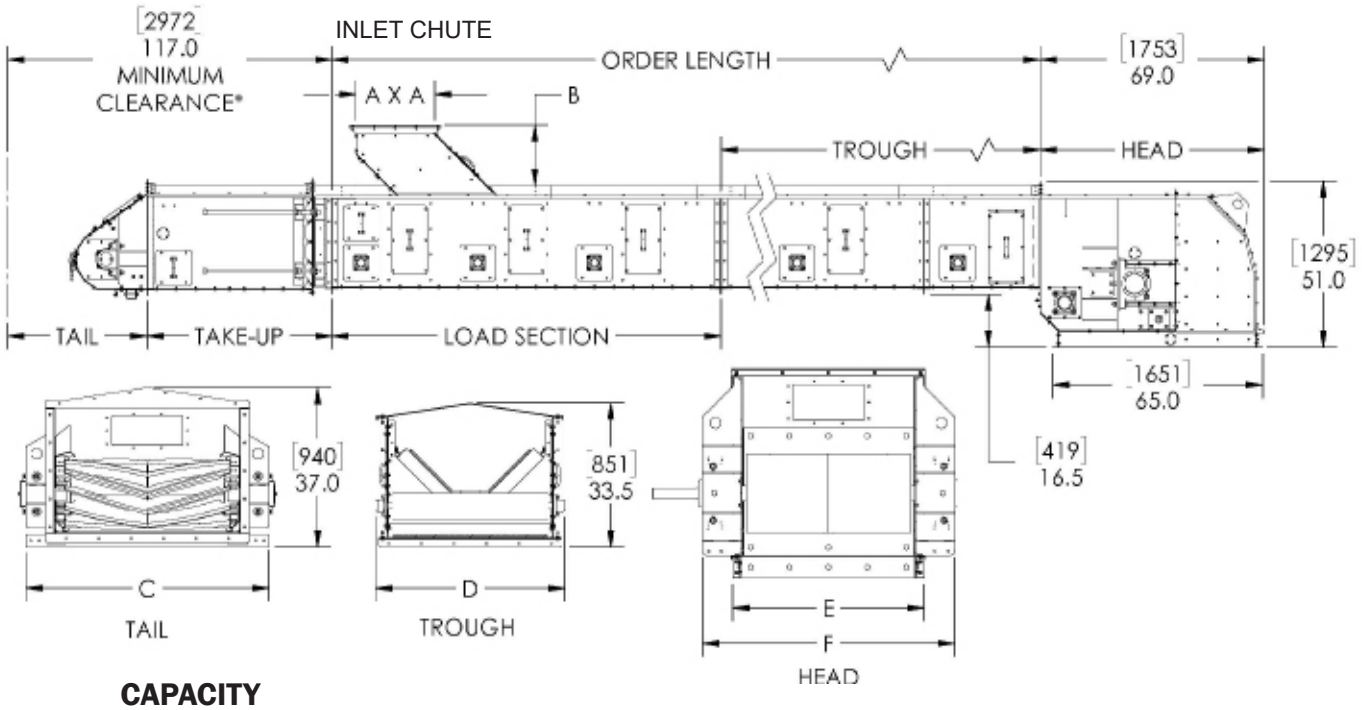
You will find a packing list attached to one of the items in the shipment. Check each item against the list. Check by description, specification, quantity, count, etc. Should there be any discrepancies, notify us immediately. If an order or shipment includes more than one Enclosed Belt Conveyor, the parts for each conveyor will be keyed or marked on the packing list for easy identification.

Small parts and items such as bolts, washers, bushings and keys are just as important to an installation as the larger parts. Make sure these are located and checked before disposing of any containers or packing. We cannot be responsible for loss of items that are listed and included on our packing list.

Should there be some delay between the time an order is received and the ensuing installation, store parts in a protected area so they may be easily located and identified. RETAIN PACKING LISTS FOR THIS REASON, AS WELL AS FOR FUTURE PARTS REFERENCE.

MODEL IDENTIFICATION

Use the charts below to identify the "EBC" model:



CAPACITY

Belt		300	350	400	450	500	550	600	650	700
	BPH	5598	6531	7464	8396	9329	10262	11195	12128	13061
24”	TPH	167	195	223	251	279	307	334	362	390
	MTPH	152	177	202	228	253	278	303	329	354
	BPH	8838	10311	11783	13256	14729	16202	17675	19148	20621
30”	TPH	264	308	352	396	440	484	528	572	616
	MTPH	240	279	319	359	399	439	479	519	559
	BPH	13943	16267	18591	20915	23239	25563	27887	30211	32535
36”	TPH	416	486	555	625	694	763	833	902	972
	MTPH	378	441	504	567	630	693	756	819	882
	BPH	18341	21397	24454	27511	30568	33624	36681	39738	42795
42”	TPH	548	639	730	822	913	1004	1096	1187	1278
	MTPH	497	580	663	746	828	911	994	1077	1160
	BPH	22709	26494	30278	34063	37848	41633	45417	49202	52987
48”	TPH	678	791	904	1017	1130	1243	1356	1470	1583
	MTPH	615	718	821	923	1026	1128	1231	1334	1436
	BPH	27323	31877	36430	40984	45538	50092	54646	59199	63753
54”	TPH	816	952	1088	1224	1360	1496	1632	1768	1904
	MTPH	741	864	987	1111	1234	1358	1481	1604	1728
	BPH	30997	36163	41329	46495	51661	56827	61993	67159	72326
60”	TPH	926	1080	1234	1389	1543	1697	1852	2006	2160
	MTPH	840	980	1120	1260	1400	1540	1680	1820	1960

**Based on 48 pcf material @ 10° surcharge angle

DIMENSIONS

Belt	A	B	C	D	E	F
24”	16” [406]	10” [254]	44” [1118]	34” [864]	32” [813]	46” [1168]
30”	20” [508]	13.5” [343]	50” [1270]	40” [1016]	38” [965]	52” [1321]
36”	24” [610]	18.5” [470]	56” [1422]	44” [1118]	44” [1118]	58” [1473]
42”	28” [711]	21.5” [546]	62” [1575]	50” [1270]	50” [1270]	64” [1626]
48”	32” [813]	23” [584]	69” [1753]	58” [1473]	57” [1448]	71” [1803]
54”	36” [914]	24.5” [622]	75” [1905]	64” [1626]	63” [1600]	77” [1956]
60”	36” [914]	30” [762]	81” [2057]	70” [1778]	69” [1753]	83” [2108]

* Based on 24” take-up. Dimensions to the nearest 1/2” - [ ] denotes dimensions in millimeters

GENERAL

Only proper installation can offer the performance intended by the manufacturer. Therefore, a good installation should be of prime concern to the customer and to the construction firm responsible for the same. A MANUFACTURER CANNOT BE RESPONSIBLE FOR THE INSTALLATION OF A CONVEYOR. The suggestions and information contained herein are offered solely as a convenience, for we assume no liability for installation, either expressed or implied.

When an Enclosed Belt Conveyor is used in conjunction with other conveyors or equipment, provisions must be made for clearances to allow for drive assemblies, discharges, chutes, etc., on all of the equipment. Also, enough clearance should be provided to allow for proper maintenance of equipment after it has been installed. Additionally, better results are achieved if the load dropped on to the belt is traveling in the same direction as the belt itself. Thought given to such matters prior to installation can prevent later problems in the flow plan and avoid possible "bottlenecks."

TROUGH INSTALLATION

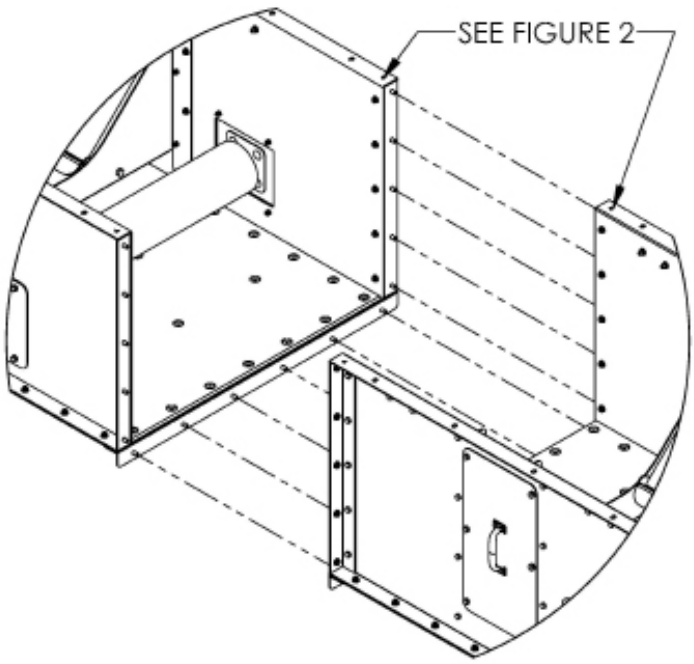
The desired length of the conveyor is achieved through a combination of head, trough, take-up, and tail sections. Lay out the unit as it will be installed, including the head, take-up, and tail sections which arrive fully assembled from the factory. When possible, make the final 45 degree trough section before the head a 5' or 10' section. Sweet EBC troughs are available in foot increments from 3' to 10' sections. Do not lift trough lengths greater than 30'. Troughs cannot be lifted from the bottom as monobolts protrude through the bottom. The installed conveyor should be supported every 10'.

The trough sections are assembled at the factory. However, care must be taken when bolting the troughs together to ensure the bottom liners are aligned properly, and trough sections are square and level. Installer should leave at least 10" from the floor to the bottom of the conveyor to allow space for bottom liner replacement.

WARNING: If height mismatches occur in the bottom liners, it will create a catch point for the belt splice and cause premature wear of the splice, a decrease in conveyor performance, and excessive noise.

The conveyor is assembled by bolting adjacent side and bottom end flanges together using 3/8" x 1" bolts and nuts (see Figure 1). Ensure that the triangles on the top flanges point towards the head (see Figure 2).

Figure 1:
Trough Splice Connection



Apply silicone caulk to all flanges prior to assembly of the trough sections. Loosely install the connecting hardware. It is recommended that a taut line be used to ensure that conveyor sections are properly squared. As stated earlier, exercise care to ensure that the inside trough bottom liners are aligned. Adjust as necessary. Once the conveyor is aligned and square, tighten connecting hardware.

Trough covers should be installed after the belt is tensioned and tracked correctly. They are designed with one permanently sealed splice attached which belongs on the tail side of the cover. As such, the covers should be installed from the tail end towards the head end (see Figure 3).

Figure 2:
Trough Install Direction

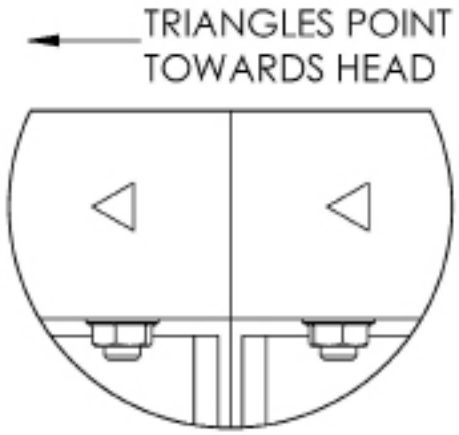
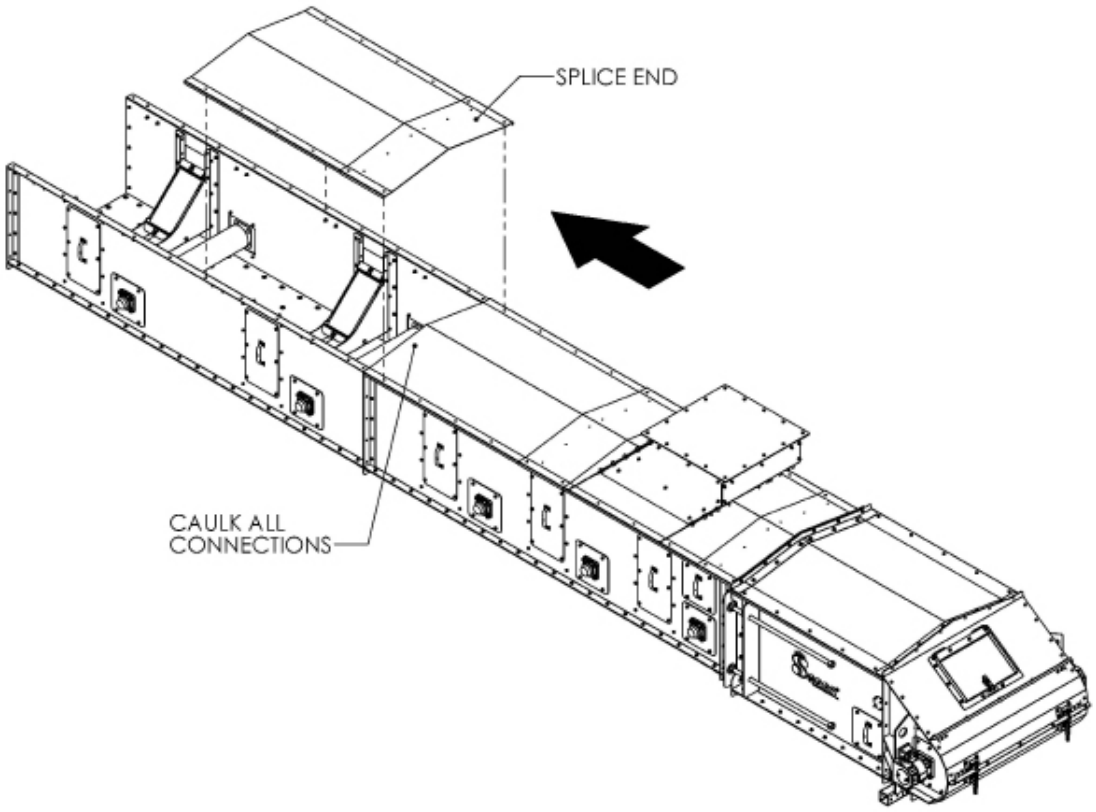


Figure 3:
Cover Installation



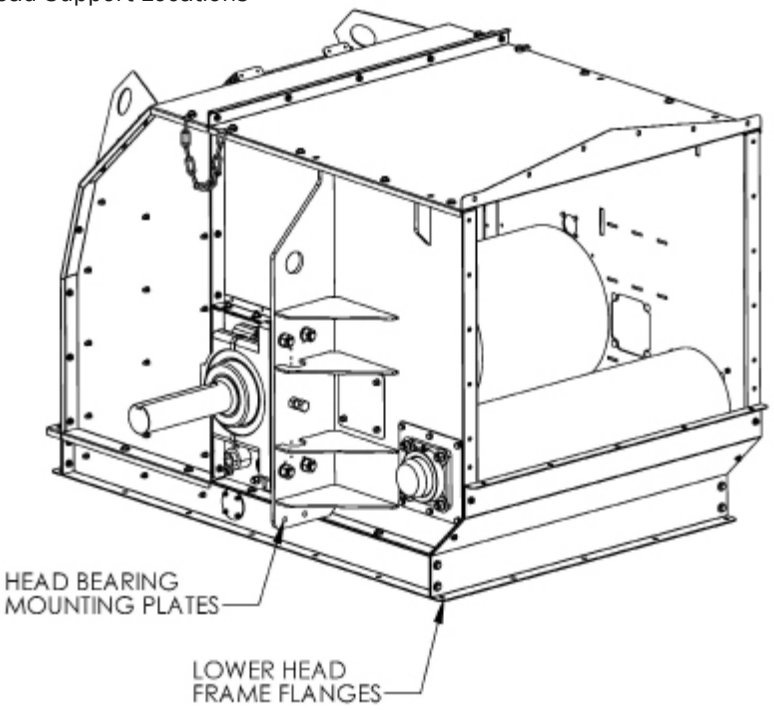
Trough covers are available in up to 5' sections. Assemble covers using 3/8" x 1" bolts and nuts. Apply silicone caulk to all cover flanges and splices prior to assembly.

Recheck all hardware for proper tightness, including bearing bolts, bearing set screws, tapered bushings, etc. These are tightened when they leave the factory; however, during shipment some hardware may have become loose.

HEAD INSTALLATION

The head assembly must be properly supported in such a way that there is no vertical or horizontal displacement. Any required support structure can be attached to the lower head frame flanges, or to the vertical head bearing mounting plates (see Figure 4). Ensure proper support for drive side of head due to the added weight from drive components.

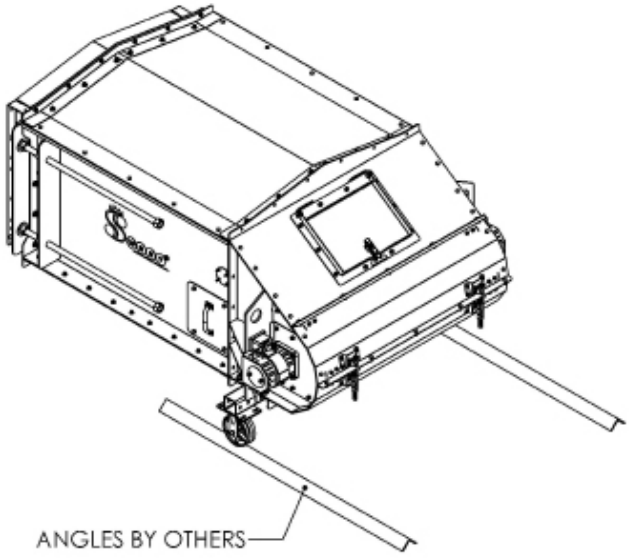
Figure 4:
Head Support Locations

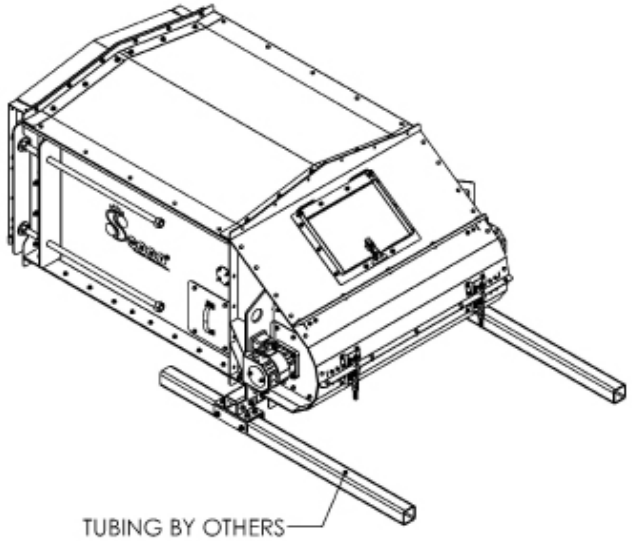


TAIL/TAKE-UP INSTALLATION

The tail and take-up assemblies must be properly supported in such a way that there is no vertical or horizontal displacement. A support tube attached to the bottom of the tail is provided for this purpose. Support adapters can be provided to interface with a support structure provided by the customer/installer (see Figure 5). Ensure that the tail cleanout door has clearance to swing freely for maintenance purposes.

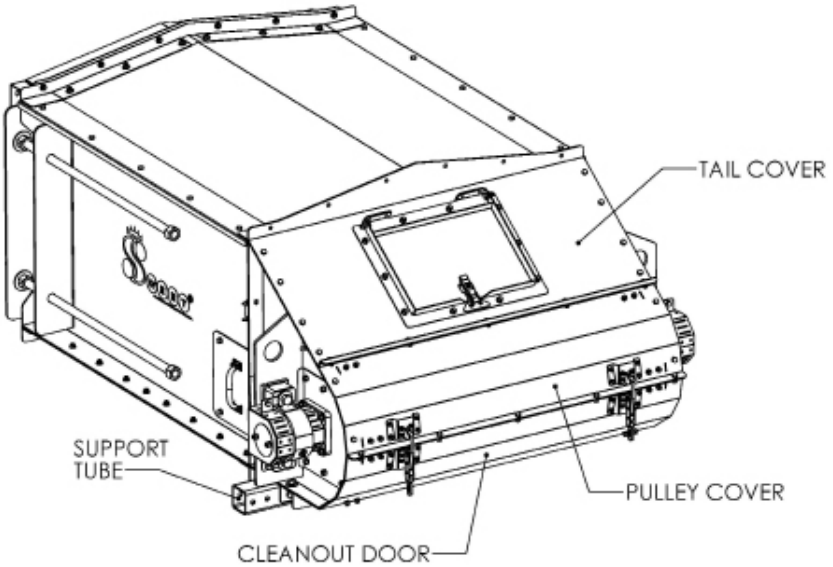
Figure 5:
Tail Support
Examples





Prior to installing the belt, the tail cleanout door should be opened, and the tail pulley cover should be removed. Removing the tail cover will provide additional access as needed as well (see Figure 6).

Figure 6:
Tail Service Panels



BELT INSTALLATION

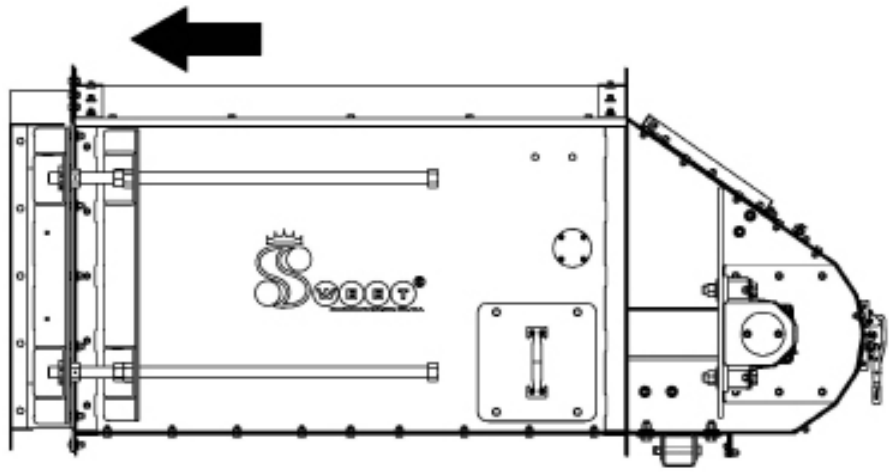
Before beginning, read and understand the belt splice instructions included with the splice kit (also included in Appendix A). Take width measurements at various points along the length of the belt to ensure a consistent width has been provided. A belt with inconsistent width will not track properly.

Belts with outside covers of different thicknesses should be installed with the thinner cover to the inside. The conveyed material will ride on the thicker cover. It is recommended to recess the splice fasteners when using a belt with an outside cover thickness greater than 1/16", leaving a minimum of 1/16" of cover (i.e. for a 3/16" cover belt, remove 1/8" of belt cover prior to splicing, leaving 1/16" of cover remaining).

Ensure that the bottom liner is dry and free of debris. Once the bottom liner is clean, a thin layer of dry flour, dry grain dust, or absorbent can be applied to the bottom liner to reduce the friction between the belt and bottom liner, making pulling the belt easier.

Fully retract the take-up section to its minimum position (see Figure 7).

Figure 7:
Tail and Take-Up Retracted



Pull the belt over the top of the head snub pulley, through the bottom of the conveyor, around the tail pulley, and back toward the head pulley. Ensure that the belt goes over the top of the snub pulley in the head (see Figure 8).

Pull the belt from the tail to the center of one of the 45 degree idler trough sections. Place a 2" X 12" wood board (not included) across the top flanges of the trough section, and lay the belt end on top of the board. Fix the belt end to the board. Wrap the opposite end of the belt around the head pulley and place it on top of the wood board (see Figure 9).

Figure 8:
Belt Path

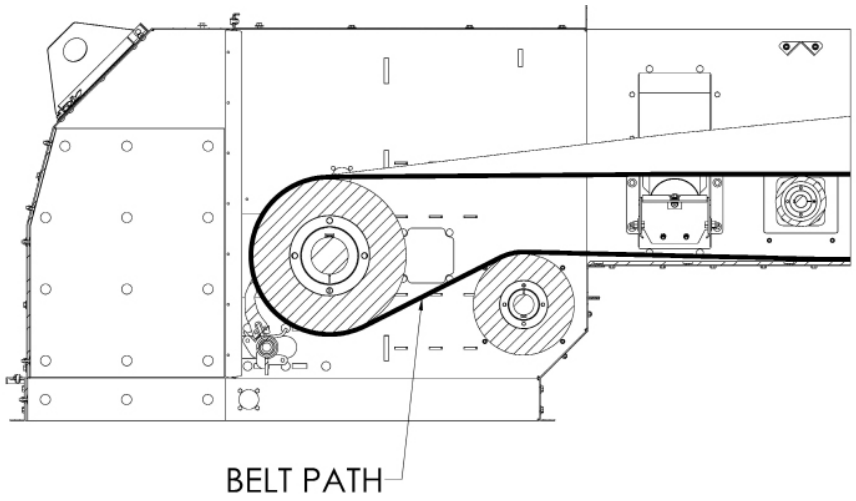
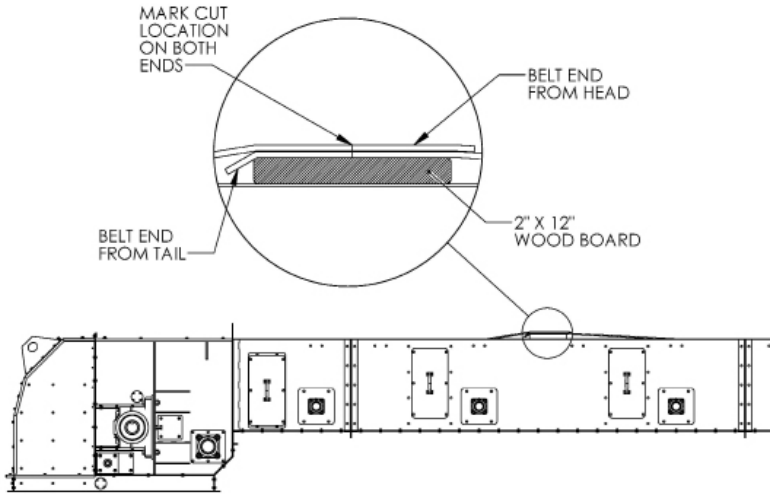


Figure 9:
Belt Cut Length



To reserve take-up length for tensioning, the belt should be pulled as tight as possible while still being able to install the splice. Mark the desired cut location on both ends of the belt.

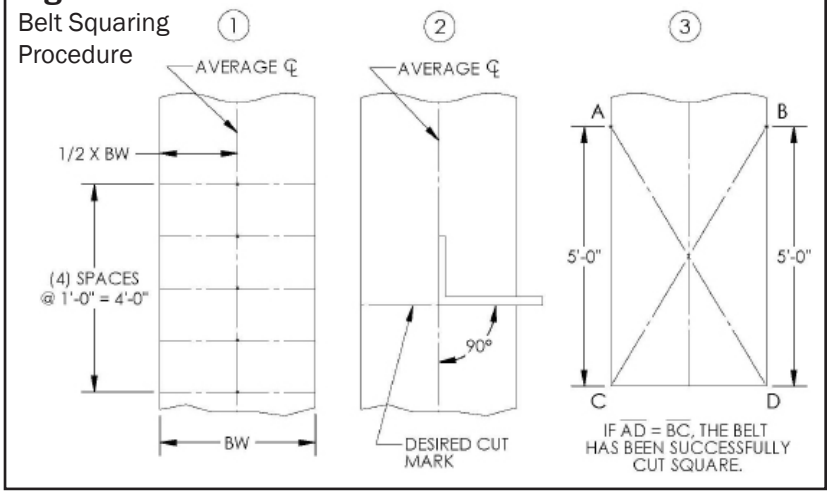
It is of the utmost importance that the ends of the belt are cut square. One method of squaring the belt ends is outlined below (see Figure 10).

1.) Measure the belt width at five locations, one foot apart, around the desired cut and mark the belt at half the width measured at each location. Draw a straight line through the five marked centers. This will serve as the average centerline.

2.) Use a square to mark the cut line perpendicular to the average center line at the desired location. Cut along the marked line.

3.) Check that the belt cut is square by marking the edge of the belt at a distance of five feet from the cut end. Measure the diagonal lengths from the marks to the opposite corner on the cut end. The diagonal measurements will be equal if the belt is cut square.

Figure 10:
Belt Squaring Procedure

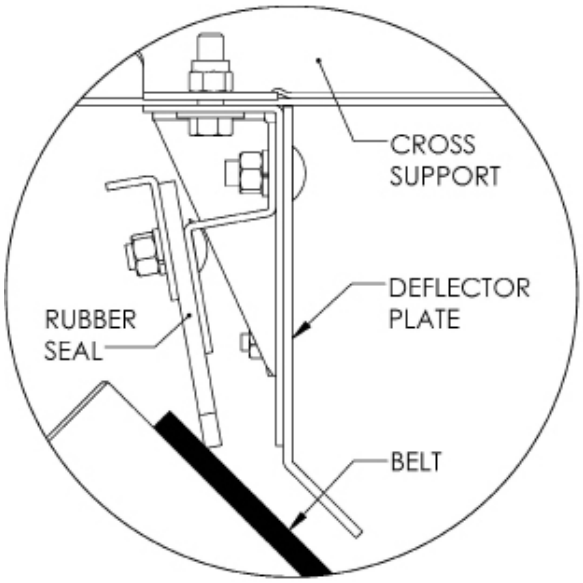


Once both ends of the belt are square and cut to length, splice the belt following the instructions with the mechanical splices included with your conveyor (see Appendix A), recessing fasteners when applicable. Finish by grinding the leading edges of the splice fasteners as smooth to the belt surface as possible.

NOTE: Instead of using mechanical splices, you may have the belt splice vulcanized by an outside firm. Vulcanizing is a process that makes a smooth splice by melting the two ends of the belt together.

LOAD SKIRT ASSEMBLY

Figure 11:
Load Skirt Detail



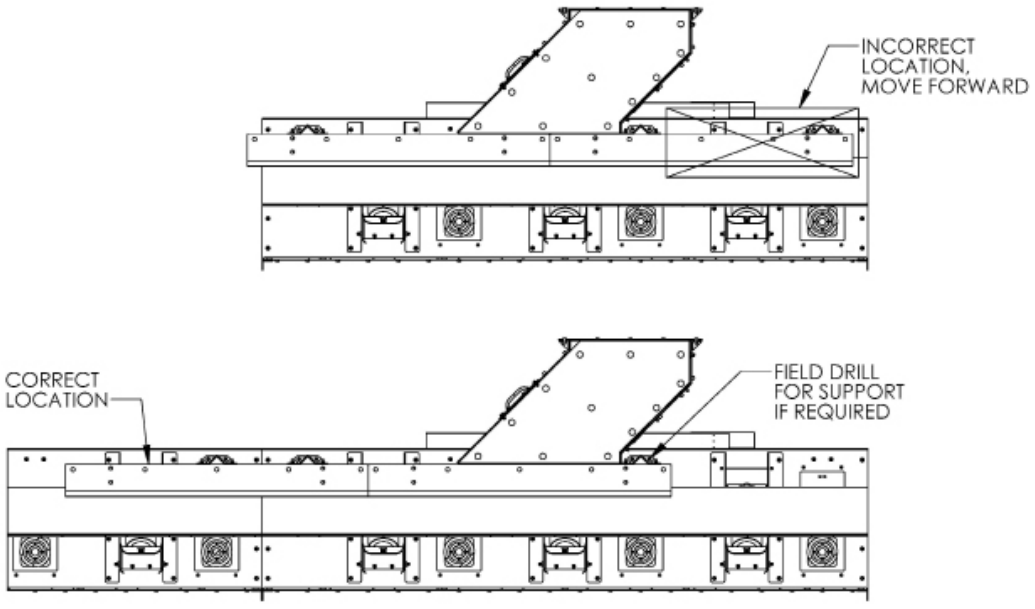
The purpose of the EBC load skirt assembly is to allow the incoming material to settle in the center of the belt once it is loaded. A deflector plate deflects material toward the center of the belt, while an adjustable rubber skirting seal prevents material spillage (see Figure 11).

When properly adjusted, the rubber skirting should retain light contact with the belt, minimizing friction while sealing the material on the belt. Hand pressure under the rubber should be adequate to flex the rubber. Excessive pressure will wear grooves in the belt cover and must be avoided.

Conveyors that utilize multiple inlets may require continuous load skirting. The settled material width may end up wider than the additional load skirt's width. In this case, material would be disrupted by the load skirt assembly sides when entering the load skirt, causing spillage.

When a conveyor with multiple inlets does not require continuous load skirting, the load skirt assemblies should be adjusted as far forward as possible while maintaining a cross support behind the inlet assembly. This will allow the material the maximum amount of distance to settle before exiting the load skirt area (see Figure 12).

Figure 12:
Load Skirt Position

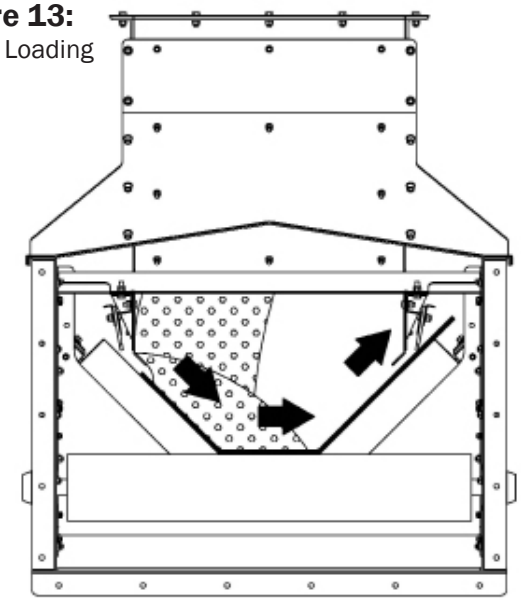


The load skirt assembly should be located & installed prior to the inlet assembly. This will require careful consideration as to where the inlet assembly will be installed so that the load skirt is in the correct location relative to the inlet assembly.

INLET ASSEMBLY

The purpose of the EBC inlet assembly is to direct incoming material in the direction of belt movement, while centering the material on the belt. Incoming material speed should match the belt speed as closely as possible to reduce belt wear and motor horsepower requirements.

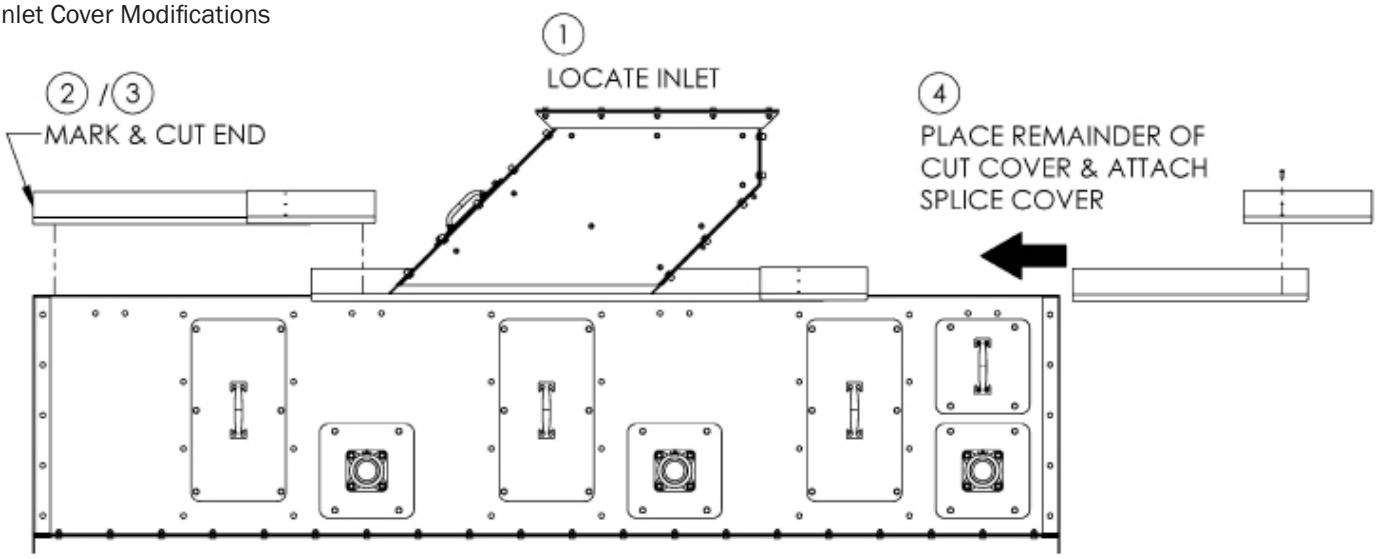
Figure 13:
Offset Loading



WARNING: Off-center loading will cause added wear to idlers, shafts, and the belt. Off-center loading will also cause belt tracking issues, and increased chance for spillage (see Figure 13).

An inlet assembly can be installed at any location along the length of the conveyor, but should always be accompanied by a trough load section, and a load skirt assembly. Inlet locations not situated at the rear or front 5' of a trough section will require that covers be field cut and may require that mounting holes be field drilled. Follow these steps to field cut covers (see Figure 14).

Figure 14:
Inlet Cover Modifications



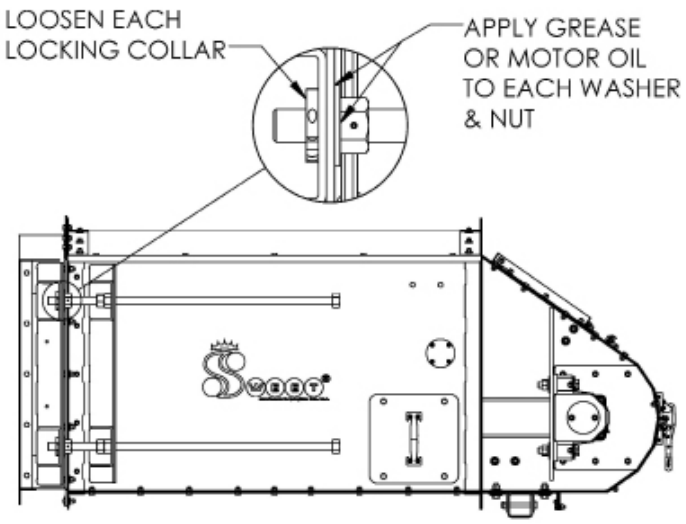
1) Locate the inlet assembly at the desired location.
2) Place a full cover section on the head side of the inlet assembly. Mark the cut location at the end of the trough.
3) Cut the cover. Take care to cut the cover straight and square, as both parts of the cut cover will be used.
4) Place the remainder of the cut cover on the tail side of the inlet assembly (the inlet assembly may need lifted to do this). Make sure the cut end is on the inlet assembly side, this will save some drilling of holes. Caulk and fasten splice cover with provided self-tapping hardware. Be sure the center of the splice cover is in line with the end of the trough section.
5) Drill holes in trough sides to match cover holes as required.

The inlet assembly closest to the take-up includes a base assembly to close off the rear of the skirting so that material does not roll back into the take-up section. Clearance around the bottom of the base assembly is intentional, and allows reclaimed material from the tail to pass. The base assembly should be installed on the inlet assembly prior to installing the inlet assembly.

BELT TENSIONING

The purpose of the take-up is: to establish and preferably maintain a pre-determined tension in the belt; to remove the accumulation of slack in the belt at startup or during momentary overloads; to provide sufficient reserve belt length to enable re-splicing if necessary; and to provide a means by which to square the tail pulley with the conveyor centerline.

Figure 15:
Take-Up Prep



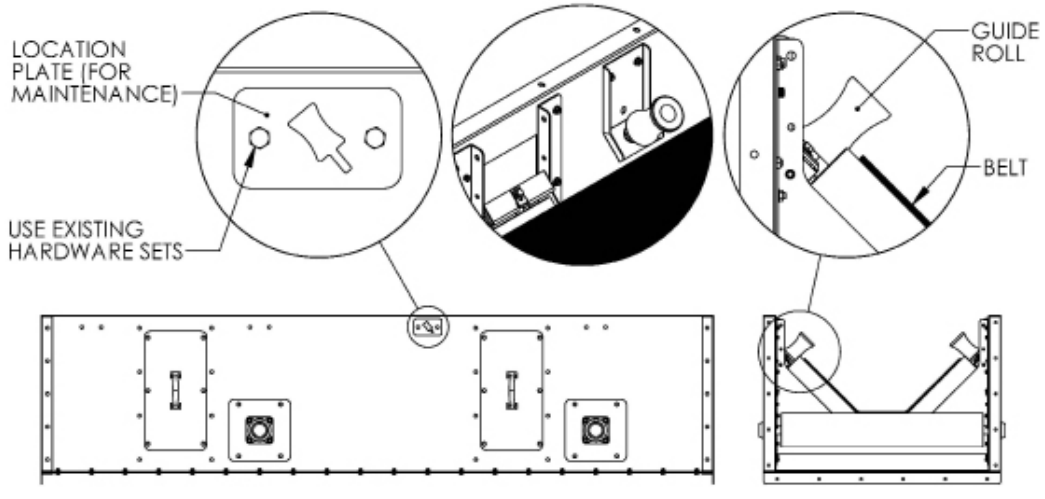
Before adjusting the screw take-ups, loosen the locking collar on each take-up rod. Apply a small amount of grease or motor oil to the washer and nut (see Figure 15).

Prior to adjusting the screw take-ups, make two marks on each edge of the carrying side belt, 100" apart. Screw take-ups should be adjusted alternately and evenly so that the take-up section doesn't bind. Ensure that the tail pulley remains square to the conveyor. Once the original 100" edge marks measure 100.5" on both edges of the belt, the belt will be adequately tensioned. Do not over tighten as too much tension may cause premature wear to all conveyor components, including the belt and bearings. Retighten the locking collars on each take-up rod.

GUIDE ROLL INSTALLATION

Your conveyor may have been supplied with a set, or sets, of guide rolls. These rolls will not aid in tracking the belt, but will help to limit damage due to a misaligned belt. The rolls limit how far up an idler the belt can climb. Guide roll sets should be located approximately 50' from the head and 50' from the tail if two or more sets are supplied. Additional guide roll sets should be spaced evenly. A plate is provided to mount to the outside of the trough to mark the location of the guide rolls for maintenance checks (see Figure 16).

Figure 16:
Belt Guide Rolls



HEAD BELT SCRAPER ADJUSTMENT

Once the belt is installed, the head belt scraper tension must be adjusted. The headbox can be unbolted and slid open (see Figure 17). Place one set of hardware in the headbox slots nearest the split for safety. You now have access to the belt scraper. Loosen both sets of scraper set screws on the outside of the conveyor (see Figure 18).

Figure 17:
Headbox Opening

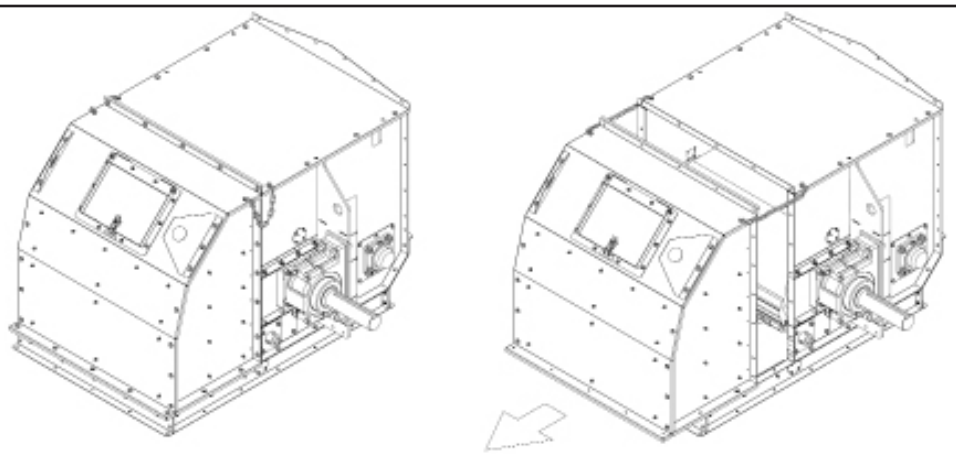
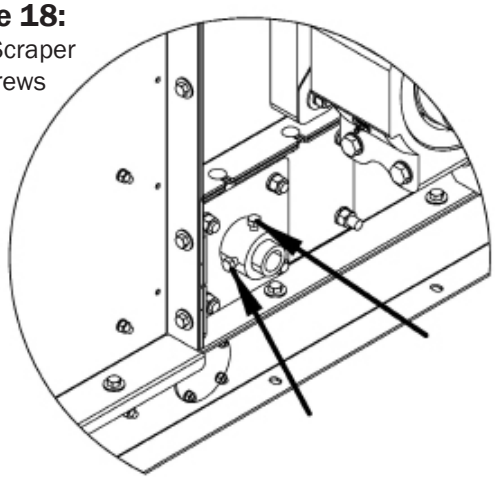
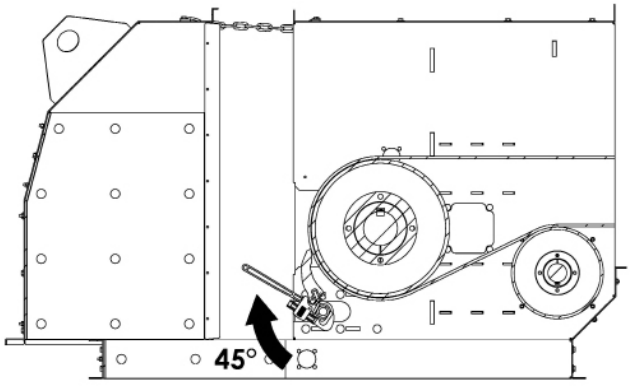


Figure 18:
Head Scraper
Set Screws



Starting with the scraper blade lightly touching the belt, use a pipe wrench to rotate the scraper pole one-eighth turn (45 degrees) towards the head pulley, then tighten both sets of set screws on the outside of the conveyor (see Figure 19). Ensure all other bolts on the scraper assembly are properly tightened. The blade will now self-adjust as it wears down throughout the usable life of the scraper blade. It is typical to hear a knocking noise as the blade scrapes over the belt splice.

Figure 19:
Head Scraper Tension



DRIVE INSTALLATION

A typical drive assembly includes a shaft mounted gear reducer, a torque arm, reducer bushings, motor mount, sheaves, sheave bushings, V-belts, and a drive guard (see Figure 20). A gearmotor drive may be supplied in place of the V-belt drive arrangement upon request (see Figure 21).

Figure 20:
V-Belt Drive (Standard)

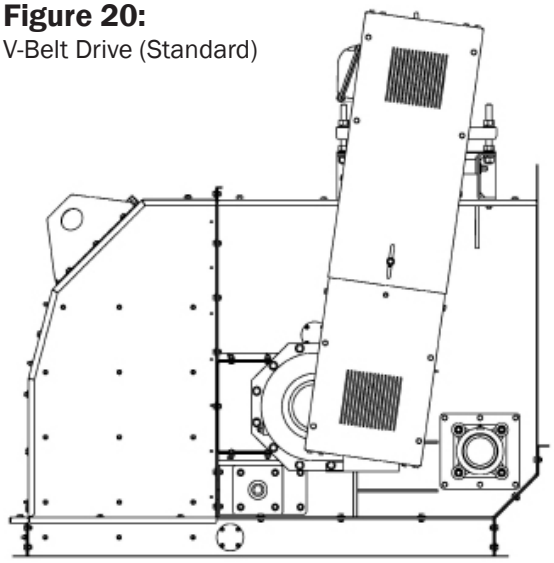


Figure 21:
Gearmotor Drive

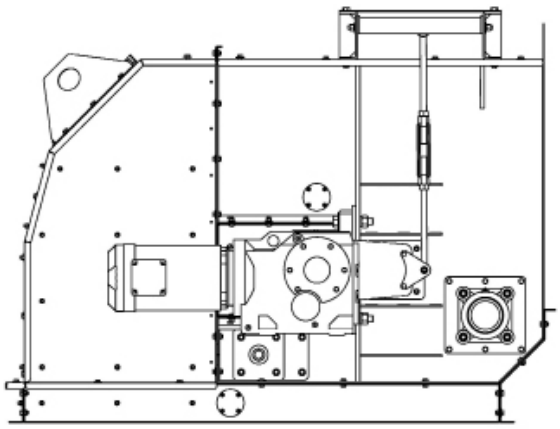
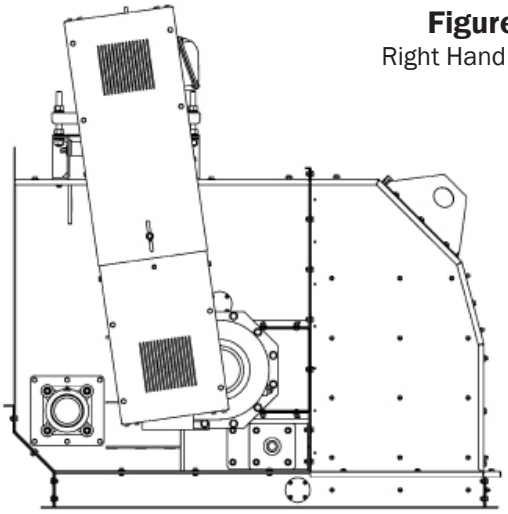


Figure 22:
Right Hand Drive

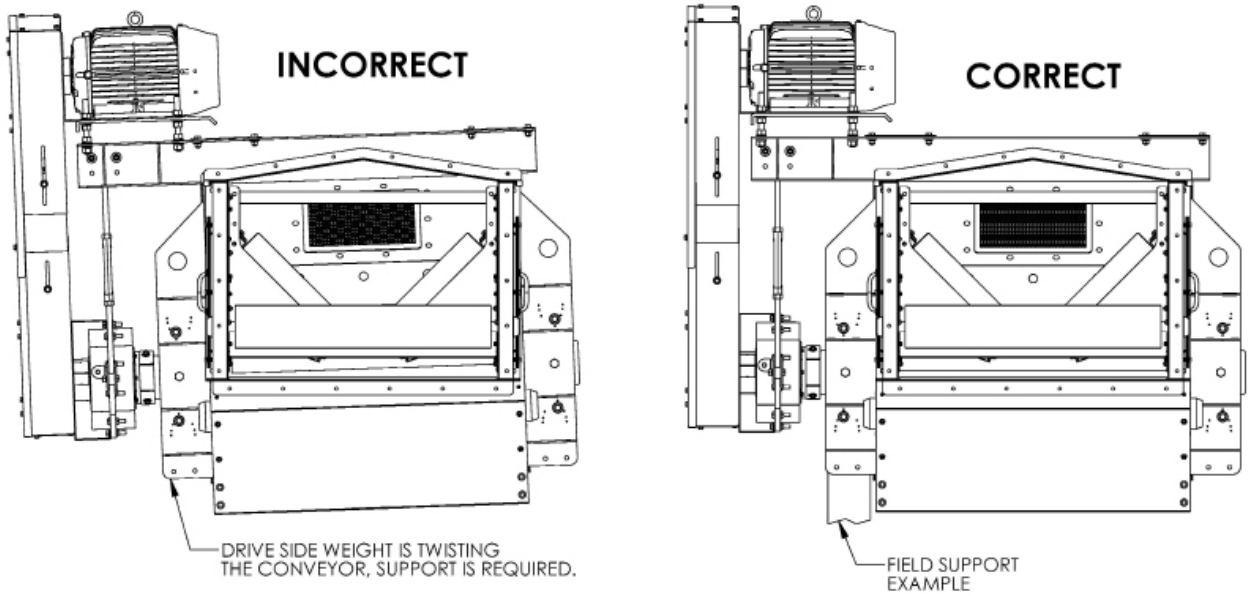


The standard mounting side for the drives is the left hand side of the conveyor when looking at the head from the tail. Drives can be supplied that mount on the right hand side of the conveyor (see Figure 22). Please specify at time of order.

It is important to note that the V-belt arrangement gear reducers are shipped without oil. Regardless of drive arrangement, after proper installation of the drive, make sure the oil level is at the manufacturer's recommended level before running the conveyor.

CAUTION: Ensure proper support for the drive side of the head to prevent conveyor twisting or failure due to the added weight of the drive components (see Figure 23).

Figure 23:
Drive Side Support



DRIVE INSTALLATION CONTINUED

CAUTION: For safe handling of the drive components, use only proper lifting equipment with enough rated capacity to lift the drive components. Lifting the motor mount, motor, or gear reducer by hand may be dangerous and is not the preferred way to install the drive assembly.

Proper installation of the drive is essential to efficient and economical operation. Install the V-belt drive assembly in the following manner, referring to Appendix B and the drive manufacturer's full assembly manual as required:

1. The drive shaft on the conveyor must be clean and free from burrs. Remove any protective coatings on the shaft using a nonflammable solvent.
2. Locate and inspect the key for the drive shaft.
3. Attach the motor mount assembly to the conveyor head (see Figure 24). Lift using the side channels, not the top cross plates.

Figure 24:
Motor Mount

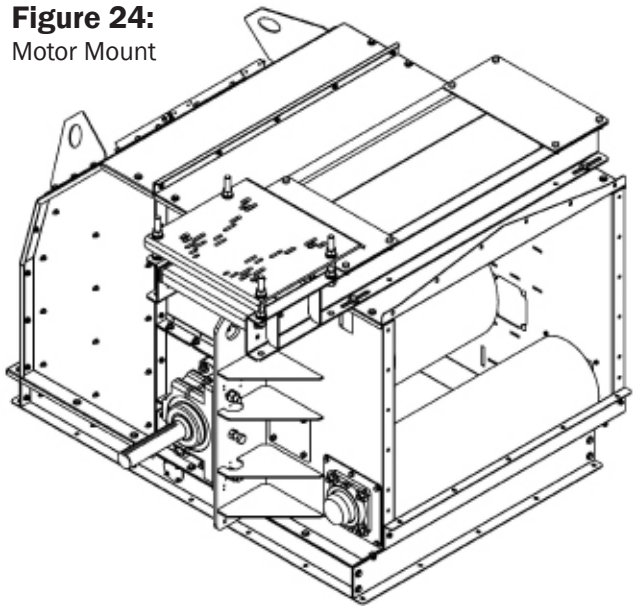
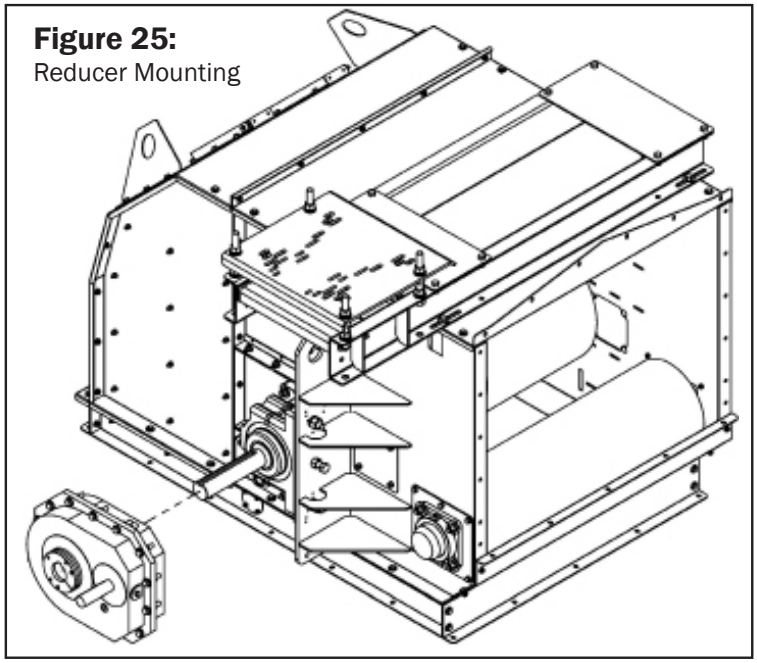


Figure 25:
Reducer Mounting



4. Once the tapered bushings are placed on the reducer, it is ready to be installed on the shaft (see Figure 25). Lift the reducer assembly and slide it onto the shaft. Do not slide the reducer all the way to the bearing guard, as the force may damage the bearing, and the bushing must be far enough from the bearing guard to allow installation and removal of the bushings (see Appendix B, Table 2).
5. Once the reducer assembly is placed on the shaft in the proper position and the key is in the proper location in the key seat, tighten the bolts on the tapered bushings per the manufacturer's specifications (see Appendix B, Table 2).
6. Attach front and rear reducer bushing guards. Adjust the rear guard so that the gap between the bushing guard and bearing guard is minimal. Loosen the appropriate housing bolts, and slide the reducer bracket over the reducer shaft (see Figure 26). Tighten the housing bolts.
7. Adjust the motor mount location so that the torque arm channel is centered over the reducer body. This will ensure that the torque arm is mounted vertically. Attach the torque arm to the torque arm channel on the motor mount and to the reducer using the supplied hardware. The angle between the torque arm rod and the line created between the conveyor shaft and the torque arm fulcrum must be 90° ± 20° (see Figure 27).
8. Mount the motor bracket and motor to the motor mount. Mount the motor as close to the motor bracket as possible to minimize shaft exposure. Adjust the motor bracket location so that the reducer bracket and the motor bracket are aligned (see Figure 28).
9. Loosen the bolts in the side slots on the drive guard to allow length adjustment. Mount the drive guard to the reducer bracket and motor bracket, but do not fully tighten the hardware.

Figure 26:
Reducer Guarding

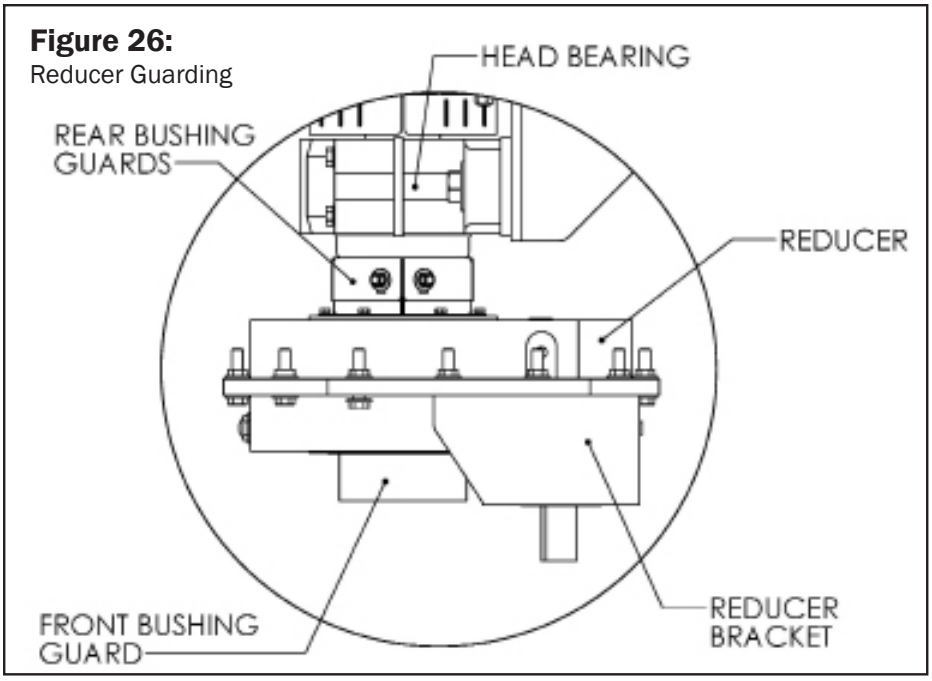
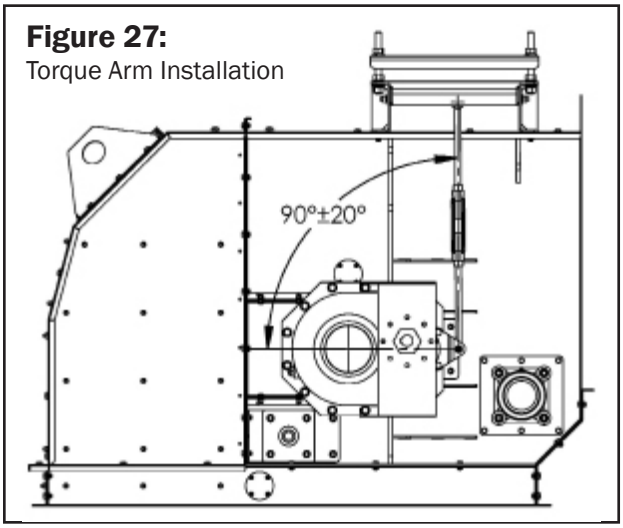


Figure 27:
Torque Arm Installation



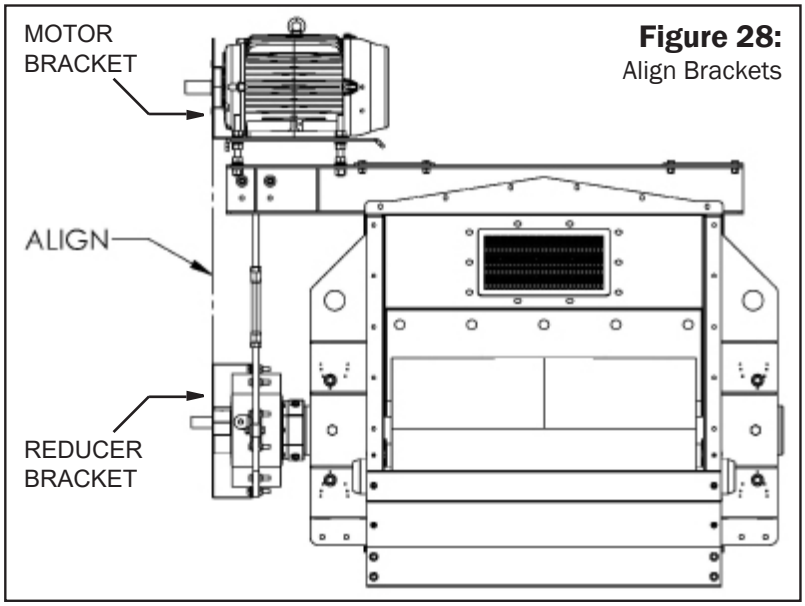


Figure 28:
Align Brackets

10. Mount the sheaves and bushings. When installing the sheaves, make sure that they are in the proper locations. The larger sheave goes on the gear reducer, unless otherwise specified. Mount the sheaves as close to the reducer and motor as possible, making sure they are in line with one another and proper clearance is given behind the sheaves/bushings for the bolts that attach the drive guard. Use a straight edge to verify sheaves are in line before proceeding with V-belt installation.
11. Install the V-belts and tighten them using the adjustments on the motor mount. It is possible to gain more adjustment by adjusting the torque arm turnbuckle, while maintaining the 90° ± 20° angle shown in Figure 27. The bolts on the drive cover brackets should be loose at this point. Refer to the supplied drive instruction sheet for properly tensioned V-belt applied force and corresponding belt deflection. After the proper tension is achieved, tighten all hardware as required and install the covers of the drive guard before operation of equipment.
12. Ensure proper vent and plug locations based on the reducer mounting position (see Appendix B, Table 1). Housing bolts may need removed and re-installed in the opposite direction to accommodate the proper vent and plug locations.

DRIVE INSTALLATION CONTINUED

Verify that the reducer has the proper amount of lubricant before running the conveyor. **The V-belt drive reducer is shipped without oil.** Refer to the manufacturer's assembly manual for the proper oil level and viscosity (see Appendix B, Tables 3 and 4).

All motor electrical connections should be performed by a qualified electrician.

TRACKING THE BELT

Tracking the belt is the procedure required to make the belt run centered when empty and when loaded. It consists of a process of adjusting the pulleys, rollers, and/or manner of loading. Belt tracking is usually minimized if the following are double checked and corrected before beginning:

- The conveyor has been installed straight, level, and square.
- All pulleys and idlers are square with the conveyor centerline.
- Belt splices are correct and square.
- All rollers and pulleys rotate freely.
- All rollers and pulleys are clean.
- There are no defects in the belting itself.

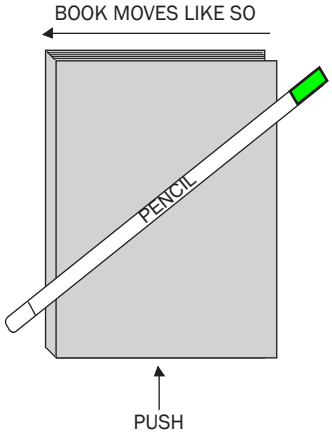
NOTE: BELT TRACKING IS USUALLY BEST ACCOMPLISHED UNDER THE SUPERVISION OF ONE PERSON OR A QUALIFIED INDIVIDUAL, AND SHOULD FIRST BE PERFORMED AFTER OBSERVING THE BELT RUN EMPTY FOR THREE FULL BELT ROTATIONS.

WARNING! For safety reasons, before adjustments are made, the motor must be locked out / tagged out electrically in such a way so that it may not be restarted by anyone! Failure to do so may result in personal injury!

The basic principal in tracking a belt is that THE BELT MOVES TOWARD THE END OF THE ROLLER/IDLER THAT IT CONTACTS FIRST. You may demonstrate this for yourself by laying a round pencil on a flat surface in a skewed orientation. Next lay a book on top of the pencil and use one finger to push the book in a line directly away. The book will move to the left or right depending on which end of the pencil it comes into contact with first (see Figure 29).

Correcting the belt can be done by shifting the ends forward of the pulleys or rollers to which the belt runs. The effect is similar to riding a bicycle. The direction of travel follows the direction the handles are turned. To correct a belt that is running too far to the right, turn the rollers to the left (see Figure 30).

Figure 29:



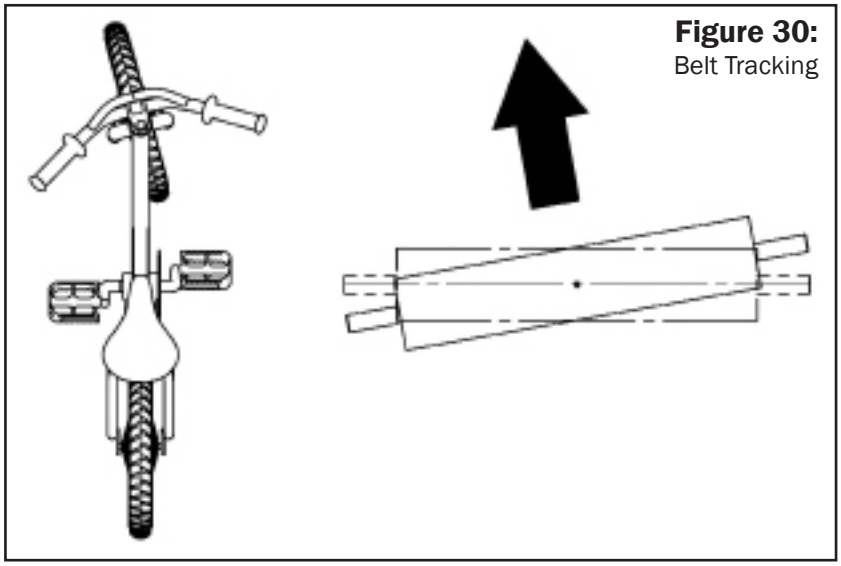


Figure 30:
Belt Tracking

The head and tail pulleys should be the first place of adjustment to correct a belt that is not tracking correctly. Once the extent of adjustment has been exhausted on the head and tail pulleys, horizontal rollers can be adjusted to remedy the tracking issue.

Several rollers should be adjusted prior to the misalignment area to create a gradual correction. To do this, loosen the roller bearing bolts and tap the bearing housing to the desired position. If more adjustment is required, the opposite side bearing bolts can be loosened, and the bearing housing can be tapped the opposite direction to the desired position. Shifting the rollers increases the wear on the rollers and bearings, so take care not to over-correct the belt. IF THE BELT IS OVER-CORRECTED, RE-ADJUST THE ROLLERS AND DO NOT SHIFT MORE ROLLERS IN THE AREA.

If all corrective measures have been applied, and a particular section of belt continues to run to one side along the entire conveyor length, the belt may be cambered at the point or may have a splice that is not properly squared. The only corrective measure for a splice out of square is to re-splice. On the other hand, slight camber in a belt may remove itself after an adequate run-in period under load.

After the belt is trained while empty, a load may be added. If the belt fails to run centered while loaded, the inlet assembly or upstream equipment should be corrected by repositioning or adding baffles to direct the force of the load so that it does not modify the belt tracking. Ideal loading is uniform, centered on the belt, and directed toward the direction of belt travel. Also, all scrapers and load skirt seals should be adjusted for uniform pressure against the belt.

The belt may be considered properly aligned if after eight hours of continuous operation under design load, the belt edges remain within the edges of the pulley face and/or within confines of the carrying idlers.

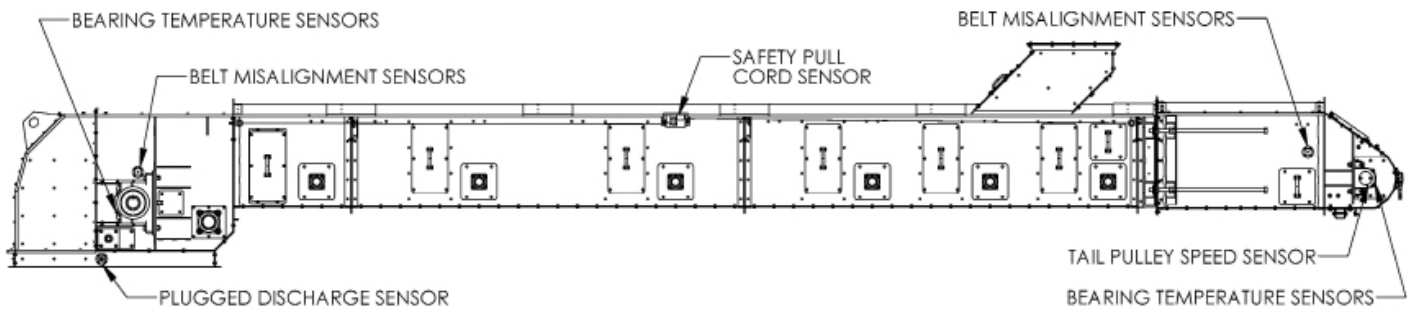
After the belt is run-in, an electrician should take readings on voltage, amperes, and wattage. This information can be used for future comparison and as a quick troubleshooting check. Higher readings in the future may indicate excessive drag due to belt misalignment or frozen idler rolls.

EQUIPMENT MONITORING

All electrical connections should be performed by a qualified electrician. Check local codes before installation of the conveyor. Optional equipment monitoring components may be required in your municipality. An aspiration system may also be required for dusty environments.
The following optional equipment monitoring components can be provided (see Figure 31):

- Bearing temperature sensors
- Belt misalignment sensors
- Plugged discharge sensor
- Tail pulley speed sensor
- Safety pull cord sensor

Figure 31:
Equipment Monitoring



Bearing temperature sensors replace the existing grease zerk on a bearing. A probe extends into the bearing housing to take readings of the bearing temperature. An increase in the typical running temperature of the bearing may indicate an issue which may lead to bearing failure. The sensor itself has a built in grease zerk so the bearing can still be greased as part of a maintenance plan.

EQUIPMENT MONITORING CONTINUED

Head pulley and take-up section have ports for belt alignment sensors. These sensors are pressure sensitive, as opposed to temperature sensitive rub blocks. This eliminates a belt wear area, and a heat inducing area, creating a safer conveyor environment while alerting you to belt tracking issues.

A port for the plugged discharge sensor is located on either side of the lower discharge frame of the head. The plugged discharge sensor can also be field mounted to the downstream equipment (transition, chute, etc.) if desired.

The tail pulley speed sensor is used to determine if the belt is slipping around the tail pulley, meaning the belt needs re-tensioned. The tail shaft guards have a round cover which can be removed for mounting the speed sensor to the shaft. Make sure that no rotating parts will contact the guard.

The safety pull cord sensor is supplied with a bracket that can be located using existing side hardware (similar to

MAINTENANCE

WARNING! Before performing any maintenance, lubrication, or inspection, the motor must be locked out/tagged out electrically in such a way so that it may not be restarted by anyone! Failure to do so may result in personal injury!

WARNING! NEVER operate equipment with any safety guards removed! Personal injury may result!

WARNING! NEVER touch or place body parts near moving conveyor and conveyor drive assembly parts! Personal injury may result!

WARNING! NEVER wear loose fitting clothing near moving conveyor and conveyor drive assembly parts! Personal injury may result!

A good maintenance program is essential to the operation and performance of any equipment and may prevent potential costly repairs. The frequency of maintenance activity will depend upon frequency of use, and severity of conditions (dusty/dirty environment, material conveyed, exposure to weather etc.). While the following are general guidelines, and maintenance intervals may be modified depending upon the installation and material conveyed, the #1 rule is...

MAINTENANCE AND OPERATIONAL PERSONNEL SHOULD ALWAYS COMPLY WITH SAFETY PROCEDURES AND A SAFETY PROGRAM

<u>After approximately ten (10) hours of initial use:</u>

- Retighten all set screws on the bearings for the head and tail shafts, as well as the bushings on the drive sheaves and speed reducer.
- Check the conveyor belt tension and V-belt tension in the drive assembly. Check skirt board rubber and belt scraper adjustment.

Depending upon the type of belting and length of conveyor, the conveyor belt itself may be the single most costly item associated with the conveyor. Therefore, maintenance of this item should be of prime concern and will be minimized if all other items are maintained properly. Inspect the belt and belt splice daily for rips and tears and periodically inspect the belt tracking throughout the work day.

INSPECTION

An inspection schedule should be established in order to ensure that the equipment is in good operating condition at all times. Regular inspections will help to reveal little things such as loose bolts, damaged belting, etc., before they become serious and damaging problems. Here are some of the items that should be inspected and maintained regularly:

1) Check set-screw tightness in bearings.
2) Check bearings for sufficient lubrication and evidence of overheating.
3) Check conveyor belt tension and condition.
4) Check drive assembly V-belt tension and condition.
5) Check drive reducer oil level. Keep breathers clean.
6) Check drive pulley rubber lagging thickness and condition.
7) Check load skirt rubber wear and adjustment.
8) Check belt scraper wear. When the blade is approximately 50% worn, it should be replaced.
9) Check guide roll wear. Excessive wear indicates a tracking issue.
10) Check tail pulley reclaim flap wear. Rotate individual flaps as they become overly worn on one side.
11) Check for excessive material build up in tail section.
12) Check depth of counterbores in bottom liners. If the belt splice can contact the liner hardware, it is time to replace the bottom liners. **Do not run the conveyor while the splice can contact the liner hardware. This could create a spark and catch fire.**
13) Check all hardware and tighten as required.
14) Check cover flange seals. Re-caulk as required.
15) Check to ensure all safety guards are firmly in place.
16) Check to ensure all equipment monitoring components are in working order.
17) Check all safety labels. When they become illegible, contact Sweet Manufacturing Company's sales department to reorder at 937-325-1511 or sales@sweetmfg.com.

The shaft mount speed reducer is lubricated by an oil reservoir in the housing. Refer to nameplate and manufacturer's service manual for lubrication instruction and oil change periods. Too much oil may cause leakage or overheating. Too little oil may cause overheating or damage to internal parts. Do not use lubricants of the EP (extreme pressure) type, those containing slippery additives, or heavy weight (90-140 wt.) gear lube. Check shaft seals for leakage and shaft bushings for tightness when performing lubrication maintenance.

The **bearings** on the head, tail, and other pulley shafts are factory lubricated with a #2 lithium grease which is suitable for most applications. For applications with 8-16 hours/day operation, the bearings should be re-greased approximately every 12 weeks. However, the interval between lubrications is best determined by actual experience.

More frequent greasing is required for extreme environments including but not limited to:
- High conveyor belt tension
- Excessive moisture or weather exposure, extreme dust, or corrosive environment

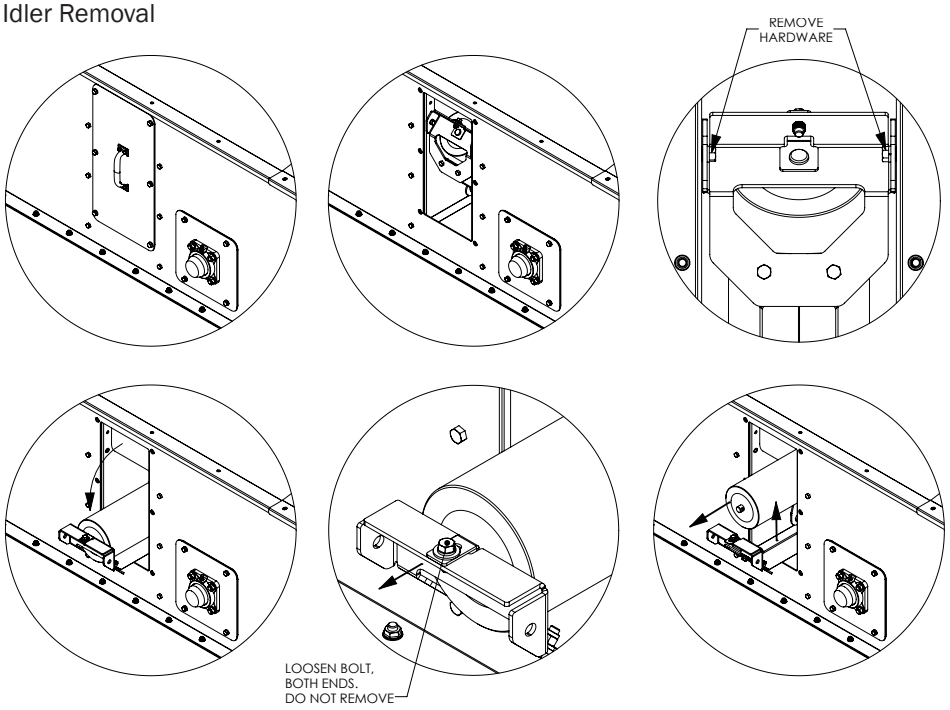
For these installations, more frequent lubrication- up to daily regreasing- may be necessary, and a reputable lubricant manufacturer may be consulted. **BEFORE GREASING, MAKE SURE THAT THE GREASE ZERK IS CLEAN.** A full bearing with slight leakage through the seals is the best protection against wear due to contaminants.

Carrying idler maintenance is of prime concern as failure of just one of these may cause irreversible damage to the conveyor belt. A frozen idler may be worn quickly to form a razor edge that may cut or tear the belt. All idlers should be inspected on a regular basis. All idlers arrive factory lubricated and sealed for life.

Replacement idlers are available for order. Should you desire to source them locally, the idler must be CEMA C – 6" and conform to the following dimensions to fit properly in the idler housing (see Figure 32 and Figure 33):
- Figure 32 (24"-30" idler housing dims)
- Figure 33 (36"-60" idler housing dims)

To remove worn idlers, follow these steps (see Figure 34 on next page):
1) Remove the idler inspection door and gasket.
2) Remove the two retaining bolts inside of the conveyor.
3) Rotate the idler assembly down and lay it flat, resting it on the bottom of the inspection door opening.
4) **LOOSEN** the retainer clip bolts. **THESE BOLTS SHOULD NOT BE REMOVED**, only loosened.
5) Slide the retainer clips out of the way, and lift the worn idler straight up out of the assembly.
6) Replace the worn idler, and slide the retainer clips of the idler shaft ends.
7) Tighten the retainer clip hardware, and rotate the idler assembly into its operating position.
8) Install the two retaining bolts inside of the conveyor.
9) Replace the gasket and idler inspection door.

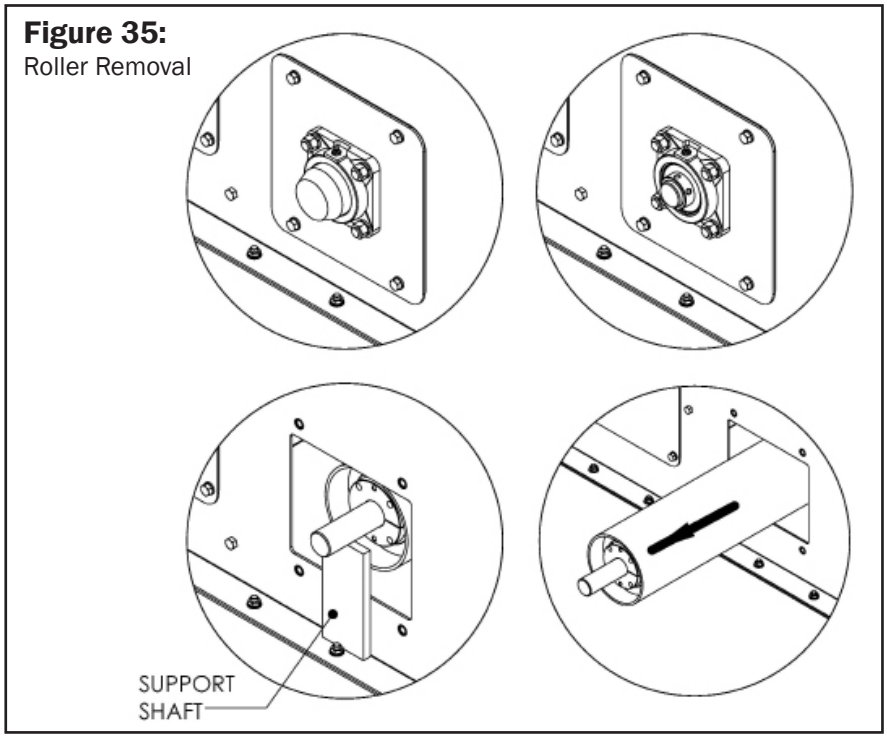
Figure 34:
Idler Removal



To remove worn horizontal rollers, follow these steps (see Figure 35):

1) Remove the shaft guards from both sides of the conveyor. Loosen the bearing set screws.
2) Remove the bearing plate assembly and gasket from one side of the conveyor. Support the shaft end.
3) Remove the shaft and pulley assembly through the side of the conveyor.
4) Replace the shaft and pulley assembly as required through the side of the conveyor.
5) Replace the gasket and bearing plate assembly.
6) Tighten the bearing set screws on both sides of the conveyor. Replace the shaft guards on both sides.

Figure 35:
Roller Removal



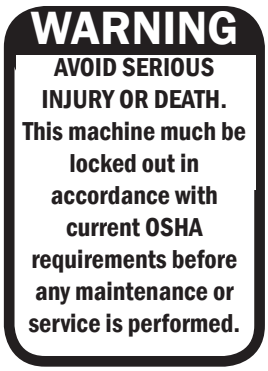
SAFETY

WARNING!

Make inspections when all operations are stopped and lockout and tagout procedures are completed.
The importance of exercising EXTREME CARE when erecting and maintaining a conveyor cannot be over emphasized. Working at heights can be hazardous, unless safety precautions are taken. In any case, BE CAREFUL - DO NOT HURRY - AND REMEMBER WHERE YOU ARE AT ALL TIMES.

Operating and maintenance personnel should be thoroughly trained in safe operating procedures, recognition of possible hazards, and maintenance of a safe area around the conveyor.

Shown at right is an example of the warning sign attached to conveyor covers. (Refer to #17 under Inspection on Page 18 for instructions to reorder safety labels.)



The following safety guidelines should be followed:

THESE ARE GUIDELINES ONLY AND COMPLIANCE WITH SAFETY STANDARDS - LOCAL, STATE AND FEDERAL, INCLUDING OSHA - IS THE RESPONSIBILITY OF THE USER.

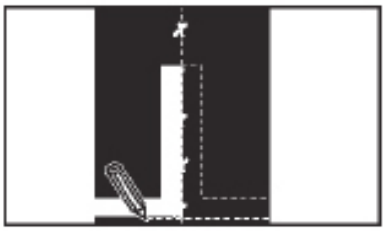
1) Maintain a safety program for all operating personnel.
2) All operating personnel should be advised of the location of all emergency controls and devices.
3) Good lighting, housekeeping, and maintenance contribute to a safe work area.
4) Frequent inspections should be made of all conveyor equipment, and all safety devices should be in position and in proper working order.
5) Conduct a pre-startup safety check of all conveyor equipment to determine that the machinery and area are safe for operation and that guards and warning devices are in place.
6) There should be absolutely **NO** reckless actions or horseplay in the vicinity of conveyors. Most accidents are caused by lack of proper safety training, carelessness, horseplay, and lack of awareness of possible hazards.
7) Conveyors should not be operated unless the conveyor housing completely encloses the moving elements and power transmission guards are in place. If the conveyor cover or housing is to be opened, the motor must be locked out/tagged out electrically in such a way that it cannot be restarted by anyone in the vicinity or remotely from the conveyor. Overflow cover sections or doors should not be opened while the conveyor is operating.
8) If, because of its application, the conveyor must have open housing, then the entire conveyor must be separated from personnel areas by a fence, and warning signs must be posted.
9) Open feed hoppers or spouts for shovel, front end loaders or their manual or mechanical loading must incorporate a grating. If the characteristics of the material being handled are such that a grating cannot be used, then the exposed portion of the conveyor must be guarded by a fence and warning signs must be posted.
10) **DO NOT** walk or stand on the conveyor cover, grating or power transmission guards.

TROUBLESHOOTING

PROBLEM	CAUSE	REMEDY
Bearing failure	Lubrication issues	Lubricate bearings
	Shafts running out of square	Square shafts
Belt damage/failure	Belt tension is too high	Check for proper tension
	Belt specs are not correct for material conveyed	Consult Sweet Manufacturing Company Sales
	Excessive material build up on return side	Ensure belt scraper is working properly, and material is not spilling over belt edge throughout the conveyor
	Head/tail pulley slippage	Install tail shaft speed sensor
Belt freeze down	Moisture under belt on return side	Moisture must be eliminated from inside of conveyor
Belt isn't tracking properly when empty	Belt end/splice is not square	Square end and re-splice
	Belt width is not consistent	Belt may need replaced.
	Conveyor not square/level	Square and/or level conveyor
	Head/tail pulley needs adjusted	Adjust head and/or tail pulley
	Idlers have a buildup of material	Clean idlers
Belt isn't tracking properly when loaded	Load is not centered on belt	Adjust loading so that material is deposited on the belt in the direction of belt movement.
Capacity is lower than expected	Head/tail pulley slippage	Adjust belt tension
	Incorrect belt speed	Drive speed needs reviewed
	Inlet/outlet blocked	Clear inlet/out of blockage
	V-belt slippage	Ensure that the v-belt tension is correct, and belts aren't worn.
Material spillage	Belt is not tracking correctly	Make adjustments to fix tracking
Material spillage at inlet	Belt is being loaded on the side of the belt, not the center	Adjust loading so that material is on the center of the belt in the direction of belt movement.
	Belt is being overfilled based on the belt speed/capacity	Regulate flow into the conveyor or adjust belt speed
	Inlet base assembly not installed	Install inlet base assembly
	Load skirt seals not adjusted	Adjust load skirt seals
Motor overloads & shuts down	Belt freeze down	Moisture must be eliminated from inside of conveyor
	Motor horsepower is too low for application	Motor horsepower needs reviewed
Splice damage/failure	Belt tension is too high	Check for proper tension
	Excessive material build up on return side	Ensure belt scraper is working properly, and material is not spilling over belt edge throughout the conveyor
Tail reclaim system excessive reloading	Belt scraper not working properly	Adjust or replace scraper blade
	Material spillage	Adjust loading so that material is on the center of the belt in the direction of belt movement.
		Adjust load skirt seals
Tail reclaim system failure	Deflector plate wear	Inspect the side deflector plates to ensure that they are not damaged
	Pulley flap wear	Rotate the flaps so that the leading edge is not worn, or replace flaps

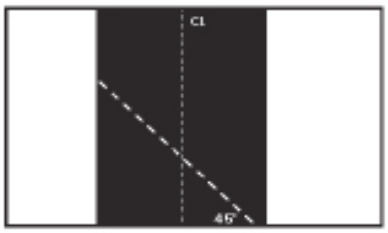
Installing Flexco® Bolt Solid Plate

Instructions for Installation • Instrucciones para su Instalación
Montagehinweise • Méthode d´Installation



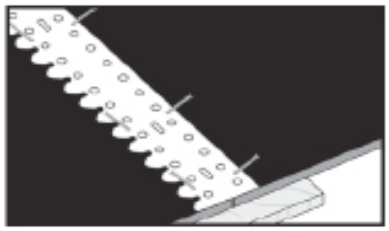
1. Square belt ends using centerline method. Cut belt ends using Flexco 900 Series Belt Cutter.

Cuadre las puntas de la banda usando el método de marcar una línea por el centro. Para cortar la banda, use la cortadora Flexco 900 Series Belt Cutter.



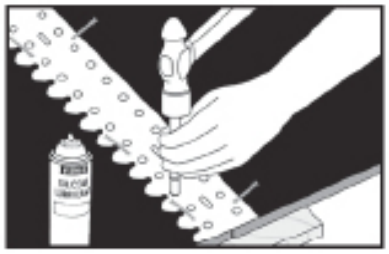
NOTE: For a 45° Splice, cut squared belt end on a 45° angle. Use the 45° cut belt end as a guide for cutting off the other end of the belt. Make sure that center lines match up and are straight.

NOTA: Para un empalme de 45°, corte el extremo del cinturón cuadrado en un ángulo de 45°. Utilice el extremo de la banda con corte de 45° como guía para cortar el otro extremo de la banda. Asegúrese de que las líneas centrales coincidan y que sean rectas.



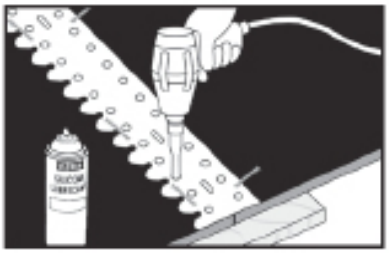
2. Support belt ends with wood plank. Nail Flexco Templet in position with belt ends tight against lugs.

Meter un bloque de madera para suportar la banda. Colocar con clavos el escantillón Flexco justo con los extremos de la banda.



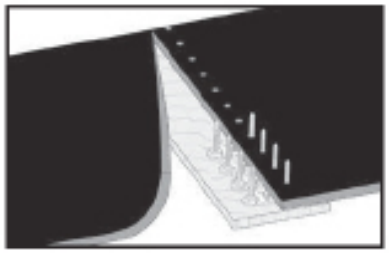
3. Spray templet holes with Flexco Silicone Lubricant. Punch or bore bolt holes. Remove templet.

Rociar las perforaciones del escantillón con silicon Flexco. Perforar. Retirar el escantillón.



NOTE: A ½" square drive electric impact wrench with Flexco 5552 Quick Change Chuck will speed hole boring operation.

NOTA: Una llave de impacto de ½" con adaptor 5552 Flexco permitirá perforar con mayor velocidad.



4. Fold one belt end back and insert bolts in one row of holes.

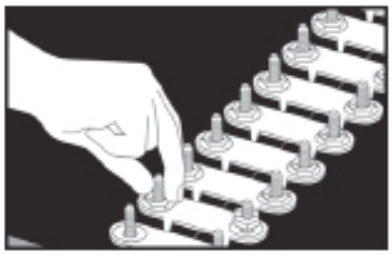
Voltear un extremo de la banda e introducir los tornillos por los huecos.

5. Align bolts with templet teeth and place the other belt end over bolts. Remove templet.

Utilizando las guias del escantillón, alinear los tornillos y colocar el otro extremo de la banda sobre ellos. Retirar el escantillón.

6. Place top plates over bolts using bolt horn.

Colocar las placas superiores sobre los tornillos usando calzador de pernos.

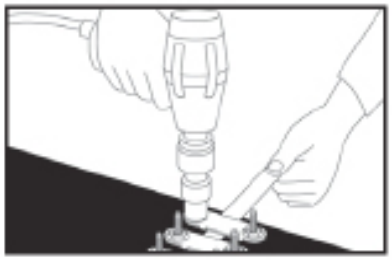


7. Start nuts on bolts by hand.

Comenzar las tuercas en los tornillos a mano.

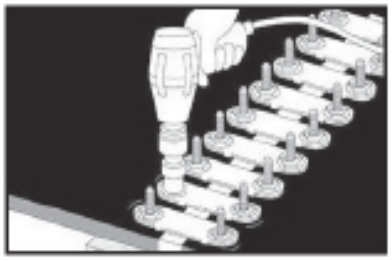
8. Cut Flexco-Lok® Tape 3-1/2 times the belt width and feed tape under top plates, under the bottom plates, then back under top plates.

Cortar la cinta FLEXCO-LOK 3-1/2 veces el ancho de la banda. Introducir la cinta bajo las placas superiores, por los inferiores y de nuevo por las de encima.



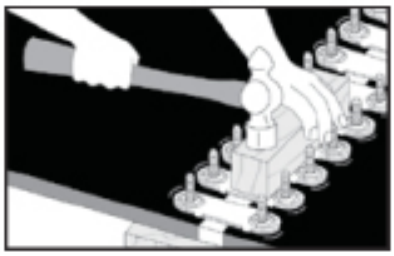
9. Pull tape tight and hold in position by tightening a fastener at each end. Then tighten all other plates.

Tirar la cinta y apretar las tuercas de las orillas de la banda. Después apretar todas las demás.



10. Tighten all fasteners from edges to center. Tighten all nuts uniformly. **NOTE:** A Flexco Power Wrench used with an impact tool will speed this step considerably.

Apretar bien de manera uniforme todas las grapas de orillas a centro. **NOTA:** Una llave de poder Flexco con la pistola de impacto permitirá mayor rapidez.



11. Hammer plates in belt with wood block. Retighten nuts.

Golpear con martillo y un bloque de madera. Apretar nuevamente las tuercas.

12. Break off excess bolt ends using two bolt breakers. Peen or grind bolts to finish.

Quebrar los pernos usando dos rompetornillos. Golpear o esmerilar los pernos.

This information has been provided by Flexco. More information can be found out www.flexco.com.

APPENDIX B - V-BELT DRIVE REDUCER INSTRUCTIONS

These instructions must be read thoroughly before installation or operation. This instruction manual was accurate at the time of printing. Please see baldor.com for updated instruction manuals.

Note! The manufacturer of these products, Baldor Electric Company, became ABB Motors and Mechanical Inc. on March 1, 2018. Nameplates, Declaration of Conformity and other collateral material may contain the company name of Baldor Electric Company and the brand names of Baldor-Dodge and Baldor-Reliance until such time as all materials have been updated to reflect our new corporate identity.

WARNING: To ensure the drive is not unexpectedly started, turn off and lock-out or tag power source before proceeding. Failure to observe these precautions could result in bodily injury.

WARNING: All products over 25 kg (55 lbs) are noted on the shipping package. Proper lifting practices are required for these products.

WARNING: Torque-Arm II product exceeding 13.5 kg (30 lbs) should be lifted using lift-assist equipment rated for the weight of the product. Weight values for all Torque-Arm II products are listing in the Gearing Engineering Catalog. Lifting brackets provided on the Torque-Arm II should be used when connecting to the lift-assist equipment.

WARNING: Depending on operating conditions, sound levels for Torque-Arm II products may exceed 70 dB. Protective measures such as hearing protection may be needed when in close proximity to a Torque-Arm II.

WARNING: Because of the possible danger to person(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed. Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions in the instruction manuals must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. Proper guards and other suitable safety devices or procedures as may be desirable or as may be specified in safety codes should be provided, and are neither provided by ABB nor are the responsibility of ABB. This unit and its associated equipment must be installed, adjusted and maintained by qualified personnel who are familiar with the construction and operation of all equipment in the system and the potential hazards involved. When risk to persons or property may be involved, a holding device must be an integral part of the driven equipment beyond the speed reducer output shaft.

INSTALLATION

1. Use lifting bracket to lift reducer.
2. Determine the running positions of the reducer. (See Figure 1). Note that the reducer is supplied with 6 plugs; 4 around the sides for horizontal installation. These plugs must be arranged relative to the running positions as follows: Install the magnetic drain plug in the hole closest to the bottom of the reducer. Throw away the tape that covers the filter/ventilation plug in shipment and install plug in topmost hole. Of the 2 remaining plugs on the sides of the reducer, the lowest one is the minimum oil level plug.

Figure 1- Mounting Positions

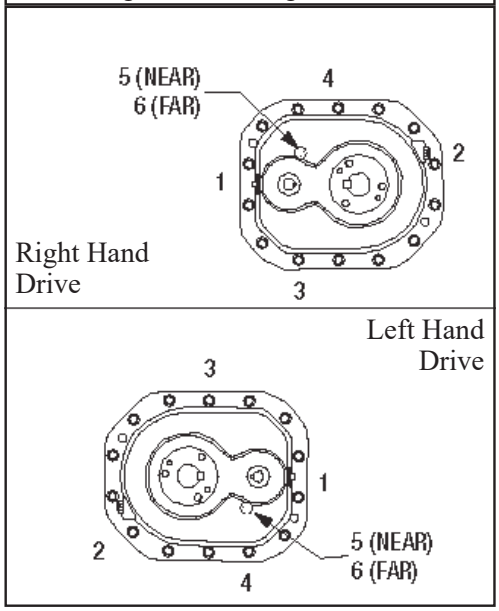


Table 1 - Output Speeds						
Output Speeds Above 15 RPM						
Mounting Position	Vent and Plug Locations					
	1	2	3	4	5	6
Right Hand	Level	Plug	Drain	Vent	Plug	Plug
Left Hand	Plug	Level	Vent	Drain	Plug	Plug

The running position of the reducer in a horizontal application is not limited to the two positions shown in Figure 1. However, if running position is over 5° in these positions, either way from sketches, the oil level plug cannot be used safely to check the oil level, unless during the checking, the torque arm is disconnected and the reducer is swung to within 5° of the positions shown in Figure 1. Because of the many possible positions of the reducer, it may be necessary or desirable to make special adaptations using the lubrication fillings holes furnished along with other standard pipes and oil level gauges as required.

If mounting the Torque-Arm II reducer on an inclined angle, consult Mechanical Power Transmission Support for proper oil level.

3. Mount reducer on driven shaft as follows: For Taper Bushed Reducer: Mount reducer on driven shaft per instruction in Torque-Arm II Bushing Installation section of this manual.
4. Install sheave on input shaft as close to reducer as practical (Figure 2).

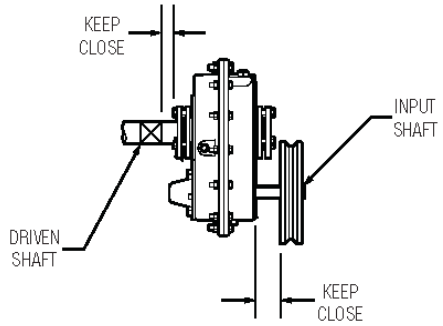


Figure 2 - Reducer and Sheave Installation

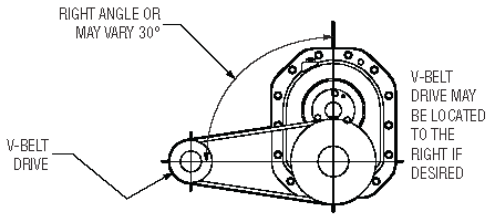


Figure 3 - Angle of V-Drive

5. If not using a Dodge Torque-Arm II motor mount, install motor and V-belt drive so belt will approximately be at right angles to the center line between driven and input shaft (Figure 3). This will permit tightening the V-belt with the torque arm.
6. Install torque arm and adapter plates reusing the reducer bolts. The adapter plates will fit in any position around the input end reducer.
7. Install torque arm fulcrum on a flat and rigid support so that the torque arm will be approximately at right angles to the center line through the driven shaft and the torque arm anchor screw (Figure 4). Make sure that ther e is sufficient take-up in the turnbuckle for belt tension adjustment when using V-Belt drive.

CAUTION: Unit is shipped without oil. Add proper amount of recommended lubricant before operating. Failure to observe this precaution could result in damage to or destruction of the equipment.

8. Fill gear reducer with recommended lubricant (Table 3).

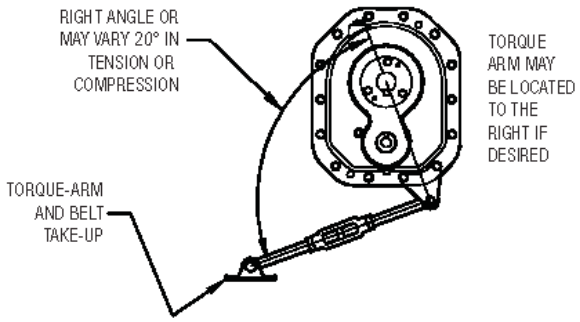


Figure 4 - Angle of Torque-Arm

TORQUE-ARM II BUSHING INSTALLATION

WARNING: To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding. Remove all external loads from drive before removing or servicing drive or accessories. Failure to observe these precautions could result in bodily injury.

The Dodge Torque-Arm II reducer is designed to fit both standard and short length driven shafts. The Standard Taper Bushings series is designed where shaft length is not a concern. The Short Shaft Bushing series is to be used where the driven shaft does not extend through the reducer.

Standard Taper Bushings:

1. One bushing assembly is required to mount the reducer on the driven shaft. An assembly consists of two tapered bushings, bushing screws and washers, two bushing backup plates and retaining rings, and necessary shaft key or keys. The driven shaft must extend through the full length of the reducer. If the driven shaft does not extend through the reducer do not use the standard tapered bushings; instead use the short shaft bushings as described in the Short Shaft Bushings section that follows. The minimum shaft length, as measured from the end of the shaft to the outer edge of the bushing flange (Figure 6). Is given in Table 2.
2. Install one bushing backup plate on the end of the hub and secure with the supplied retaining ring. Repeat procedure for other side.
3. Place one bushing, flange end first, onto the driven shaft and position per dimension “A”, as shown in Table 2. This will allow the bolts to be threaded into the bushing for future bushing and reducer removal.
4. Insert the output key in the shaft and bushing. For easy of installation, rotate the driven shaft so that the shaft keyseat is at the top position.

PLEASE NOTE – In most cases the keys that are supplied with the bushing kit are NOT square keys, and the orientation of the key is important. Install the key so that it fits snugly in the width of the keyseat. The keys are marked with a part number and some keys are also etched with “THIS SIDE UP” – these markings should be showing on the top of the key when it is installed in the shaft keyseat, see Figure 5 below.

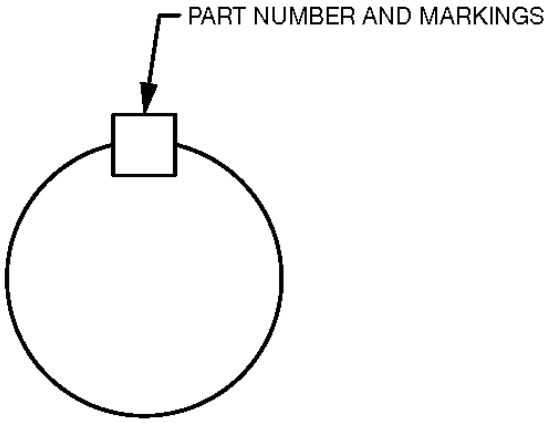


Figure 5- Key Marking

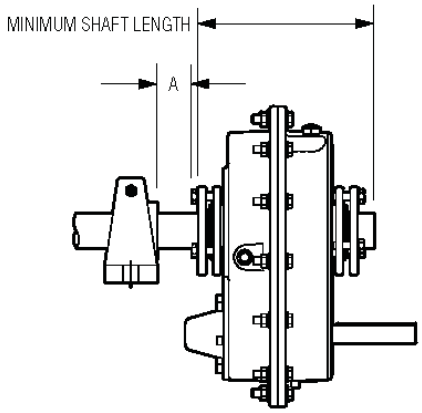


Figure 6 – Minimum Recommended Dimensions

5. Mount the reducer on the driven shaft and align the shaft key with the reducer hub keyway. Maintain the recommended minimum distance “A” from the shaft bearing.
6. Insert the screws, with washers installed, in the unthreaded holes in the bushing flange and align with the threaded holes in the bushing backup plate. If necessary, rotate the bushing backup plate to align with the bushing screws. Tighten the screws lightly. If the reducer must be positioned closer than dimension “A”, place the screws with washers installed, in the unthreaded holes in the bushing before positioning reducer making sure to maintain at least 1/8” between the screw heads and the bearing.
7. Place the second tapered bushing in position on the shaft and align the bushing keyway with the shaft key. Align the unthreaded holes in the bushing with the threaded holes in the bushing backup plate. If necessary, rotate the bushing backup plate to align with the bushing holes. Insert bushing screws, with washers installed in the unthreaded holes in the bushing. Tighten screws lightly.
8. Alternately and evenly tighten the screws in the bushing nearest the equipment to the recommended torque given in Table 2. Repeat procedure on outer bushing.

Table 2- Bolt Torques			
Bushing Screw Info & Minumum Clearance for Removal			
Reducer Size	Fastener Size	Torque in lb-ft	A (Inch)
TA0107L	5/16-18	20-17	1.08
TA1107H	5/16-18	20-17	1.20
TA2115H	3/8-16	20-17	1.20
TA3203H	3/8-16	20-17	1.20
TA4207H	3/8-16	26-23	1.48
TA5215H	1/2-13	77-67	1.81
TA6307H	1/2-13	77-67	1.81
TA7315H	1/2-13	77-67	2.06
TA8407H	1/2-13	77-67	2.06
TA9415H	5/8-11	86-75	2.39
TA10507H	5/8-11	86-75	2.39
TA12608H	5/8-11	86-75	2.39

Bushing Removal for Standard Taper or Short Shaft Bushings:

1. Remove bushing screws.
2. Place the screws in the threaded holes provided in the bushing flanges. Tighten the screws alternately and evenly until the bushings are free on the shaft. For ease of tightening screws make sure screw threads and threaded holes in the bushing flanges are clean. If the reducer was positioned closer than the recommended minimum distance "A" as shown in Table 2, loosen the inboard bushing screws until they are clear of the bushing flange by 1/8". Locate two (2) wedges at 180 degrees between the bushing flange and the bushing backup plate. Drive the wedges alternately and evenly until the bushing is free on the shaft.
3. Remove the outside bushing, the reducer, and then the inboard bushing.

LUBRICATION

NOTE: Because reducer is shipped without oil, it is necessary to add the proper amount of oil before operating reducer. Use a high-grade petroleum base rust and oxidation inhibited (R&O) gear oil (Tables 3 and 4). Follow instructions on reducer warning tags, and in the installation manual.

For average industrial operating conditions, the lubricant should be changed every 2500 hours of operation or every 6 months, whichever occurs first. Drain reducer and flush with kerosene, clean magnetic drain plug and refill to proper level with new lubricant.

CAUTION: Too much oil will cause overheating and too little will result in gear failure. Check oil level regularly. Failure to observe this precaution could result in bodily injury.

Under extreme operating conditions, such as rapid rise and fall of temperature, dust, dirt, chemical particles, chemical fumes, or oil sump temperatures above 200 ° F, the oil should be changed every 1 to 3 months, depending on severity of conditions.

Table 3- Oil Volumes

Approximate Reducer Size		Volume of Oil to Fill Reducer to Oil Level Plug ① ④			
		② Right Hand Position		② Left Hand Position	
		③ Quart	Liter	③ Quart	Liter
TA0107L	Single	0.7	0.6	0.7	0.6
	Double	0.7	0.6	0.6	0.6
TA1107H	Single	1.3	1.3	0.7	0.6
	Double	1.3	1.3	0.6	0.6
TA2115H	Single	2.1	2.0	1.1	1.0
	Double	2.1	2.0	1.0	1.0
TA3203H	Single	2.8	2.7	1.8	1.7
	Double	2.8	2.7	1.7	1.6
TA4207H	Single	4.4	4.2	2.9	2.8
	Double	4.4	4.2	2.8	2.6
TA5215H	Single	7.4	7.0	5.8	5.5
	Double	7.4	7.0	5.5	5.2
TA6307H	Single	8.8	8.4	6.6	6.2
	Double	8.8	8.4	6.2	5.9
TA7315H	Single	8.4	8.0	13.9	13.2
	Double	8.4	8.0	13.2	12.5
TA8407H	Single	N/A	N/A	N/A	N/A
	Double	7.7	7.3	13.7	12.9
TA9415H	Single	N/A	N/A	N/A	N/A
	Double	17.0	16.1	18.1	17.1
TA10507H	Single	N/A	N/A	N/A	N/A
	Double	38.0	36.0	25.8	24.4
TA12608H	Single	N/A	N/A	N/A	N/A
	Double	53.0	50.2	37.1	35.1

① Oil quantity is approximate. Service with lubricant until oil runs out of oil level hole.

② Refer to Figure 1 for mounting positions.

③ US measure: 1 quart = 32 fluid ounces = .94646 liters.

④ Below 15 RPM output speed, oil level must be adjusted to reach the highest oil level plug. If reducer position is to vary from those shown in Figure 1, either more or less oil may be required. Consult Mechanical Power Transmission Support, Greenville, SC.

Reducers with a 5:1 ratio are single-reduction. All other ratios are double-reduction.

Table 4 – Oil Recommendations

Output RPM	ISO Grades For Ambient Temperatures of 50˚ F to 125˚ F * (10˚ C to 51˚ C)											
	Torque-Arm II Reducer Size											
	TA0107L	TA1107H	TA2115H	TA3203H	TA4207H	TA5215H	TA6307H	TA7315H	TA8407H	TA9415H	TA10507H	TA12608H
301 – 400	320	320	320	220	220	220	220	220	220	220	220	220
201 – 300	320	320	320	220	220	220	220	220	220	220	220	220
151 – 200	320	320	320	220	220	220	220	220	220	220	220	220
126 – 150	320	320	320	220	220	220	220	220	220	220	220	220
101 – 125	320	320	320	320	220	220	220	220	220	220	220	220
81 – 100	320	320	320	320	320	220	220	220	220	220	220	220
41 – 80	320	320	320	320	320	220	220	220	220	220	220	220
11 – 40	320	320	320	320	320	320	320	320	320	320	220	220
1 – 10	320	320	320	320	320	320	320	320	320	320	320	320
Output RPM	ISO Grades For Ambient Temperatures of 15˚ F to 60˚ F * (-9.4˚ C to 15˚ C)											
	Torque-Arm II Reducer Size											
	TA0107L	TA1107H	TA2115H	TA3203H	TA4207H	TA5215H	TA6307H	TA7315H	TA8407H	TA9415H	TA10507H	TA12608H
301 – 400	220	220	220	150	150	150	150	150	150	150	150	150
201 – 300	220	220	220	150	150	150	150	150	150	150	150	150
151 – 200	220	220	220	150	150	150	150	150	150	150	150	150
126 – 150	220	220	220	150	150	150	150	150	150	150	150	150
101 – 125	220	220	220	220	150	150	150	150	150	150	150	150
81 – 100	220	220	220	220	220	150	150	150	150	150	150	150
41 – 80	220	220	220	220	220	150	150	150	150	150	150	150
11 – 40	220	220	220	220	220	220	220	220	220	220	150	150
1 – 10	220	220	220	220	220	220	220	220	220	220	220	220

NOTES:

1. Assumes auxiliary cooling where recommended in the catalog.
2. Pour point of lubricant selected should be at least 10°F lower than expected minimum ambient starting temperature.
3. Extreme pressure (EP) lubricants are not necessary for average operating conditions. When properly selected for specific applications, TORQUE-ARM II backstops are suitable for use with EP lubricants.
4. Special lubricants may be required for food and drug industry applications where contact with the product being manufactured may occur. Consult a lubrication manufacturer's representative for his recommendations.
5. For reducers operating in ambient temperatures between -22°F (-30°C) and 20°F (–6.6°C) use a synthetic hydrocarbon lubricant, 100 ISO grade or AGMA 3 grade (for example, Mobil SHC627). Above 125°F (51°C), consult Mechanical Power Transmission Support, Greenville, SC for lubrication recommendation.
6. Mobil SHC630 Series oil is recommended for high ambient temperatures.

GUIDELINES FOR TORQUE-ARM II REDUCER LONG-TERM STORAGE

During periods of long storage, or when waiting for delivery or installation of other equipment, special care should be taken to protect a gear reducer to have it ready to be in the best condition when placed into service.

By taking special precautions, problems such as seal leakage and reducer failure due to lack of lubrication, improper lubrication quantity, or contamination can be avoided. The following precautions will protect gear reducers during periods of extended storage:

Preparation:

1. Drain oil from the unit. Add a vapor phase corrosion inhibiting oil (VCI-105 oil by Daubert Chemical Co.) in accordance with Table 5.
2. Seal the unit airtight. Replace the vent plug with a standard pipe plug and wire the vent to the unit.
3. Cover all unpainted exterior parts with a waxy rust preventative compound that will keep oxygen away from the bare metal. (Non-Rust X-110 by Daubert Chemical Co. or equivalent).
4. The instruction manuals and lubrication tags are paper and must be kept dry. Either remove these documents and store them inside, or cover the unit with a durable waterproof cover which can keep moisture away.
5. Protect reducer from dust, moisture, and other contaminants by storing the unit in a dry area.
6. In damp environments, the reducer should be packed inside a moisture-proof container or an envelope of polyethylene containing a desiccant material. If the reducer is to be stored outdoors, cover the entire exterior with a rust preventative.

When placing the reducer into service:

1. Fill the unit to the proper oil level using a recommended lubricant. The VCI oil will not affect the new lubricant.
2. Clean the shaft extensions with petroleum solvents.
3. Assemble the vent plug into the proper hole.
4.

Follow the installation instructions provided in this manual.

Table 5 – Quantities of VCI #105 Oil

Reducer Size	Quantity (Ounces / Milliliter)
TA0107L	1 / 30
TA1107H	1 / 30
TA2115H	1 / 30
TA3203H	1 / 30
TA4207H	1 / 30
TA5215H	2 / 59
TA6307H	2 / 59
TA7315H	3 / 89
TA8407H	3 / 89
TA9415H	4 / 118
TA10507H	6 / 177
TA12608H	8 / 237

VCI #105 and #10 are interchangeable.
VCI #105 is more readily available.

OIL VISCOSITY EQUIVALENCY CHART

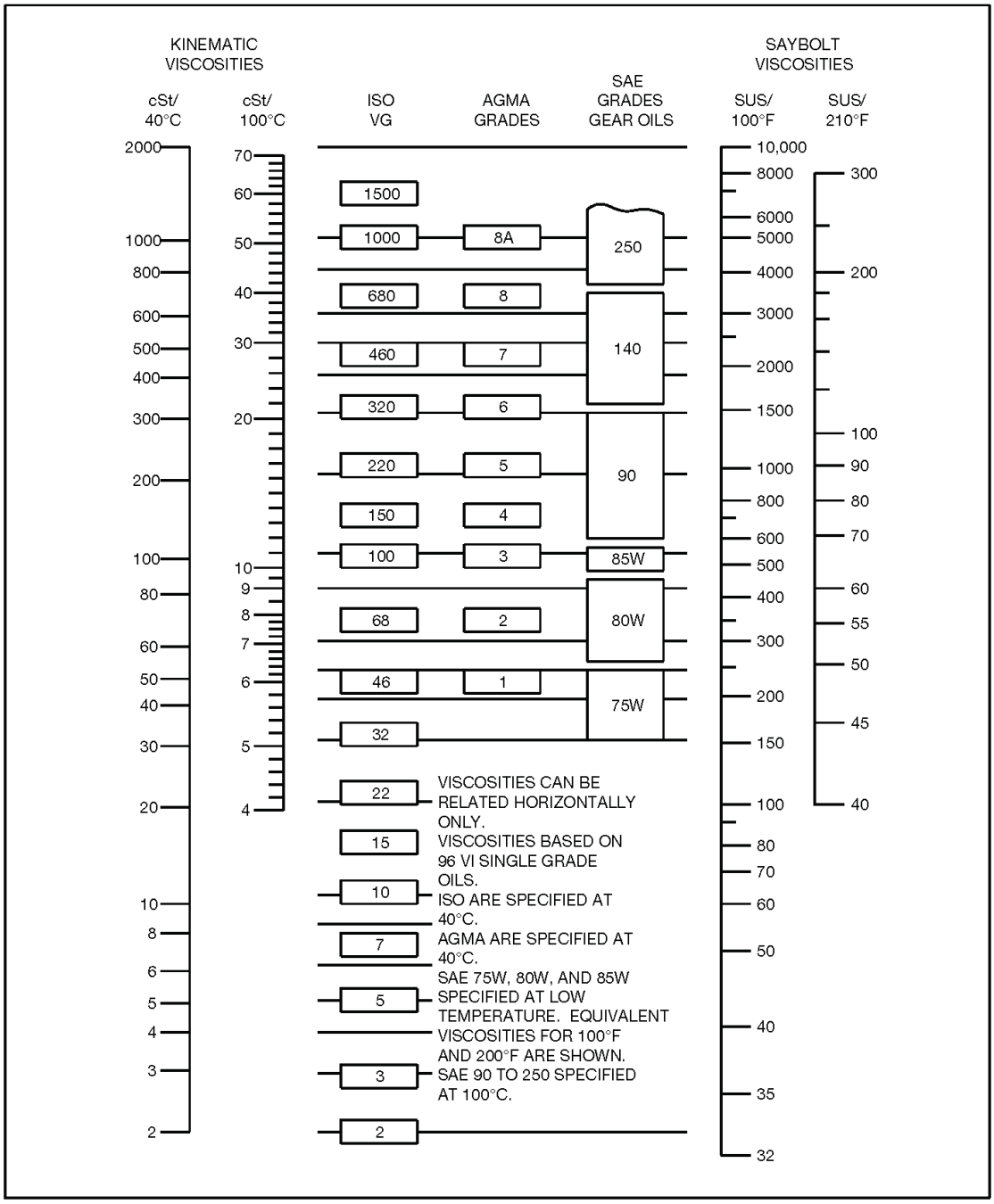


Figure 7- OIL VISCOSITY EQUIVALENCY CHART

This information has been provided by ABB Motors and Mechanical, Inc. The complete manual is available at www.baldor.com.

BEARING TEMPERATURE SENSOR

PRODUCT OVERVIEW

The ADB series can be used on any application where bearing temperature monitoring is required. They have been designed to allow the depth of the probe to be adjustable depending on the application. Probes are available in 2, 3, 4, 6, 8, 10 and 12 inch lengths (special order lengths available on request).

The sensors screw directly into the bearing housing using the existing grease zerk. The body of the ADB has a grease zerk, allowing lubrication of the bearing without the need to remove the sensor. The ADB style sensors are available with a standard NTC thermistor for 4B's Hotbus and Watchdog systems, or a PT100 - RTD type for PLC and DCS systems. Both types allow for continuous temperature monitoring.

ADB cable connections are not polarity sensitive, so no special connection requirements are needed.

SPECIFICATIONS

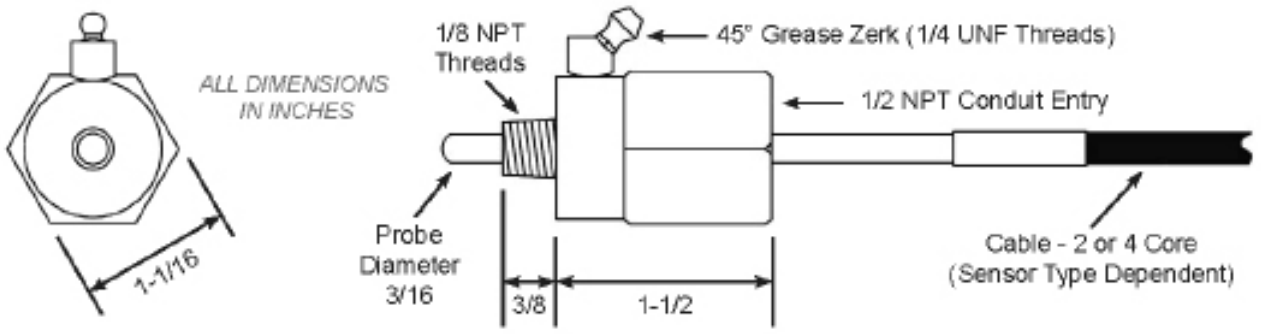
ADB20V3C - NTC Sensors

Resistance at 77° F -	10,000 Ohms
Resistance at 140° F -	3,043 Ohms
Resistance at 194° F -	1,264 Ohms
Sensing Voltage -	5 to 24 VDC
Current Draw -	1 mA (Max. Recommended)
Maximum Power -	120 mW at 77° F (25° C)
Body Housing -	304 Stainless Steel
Fixing Thread -	1/8" NPT
Cable -	9 ft. (3 m) - 2 Conductor
Operating Temp. -	Minimum: -22° F (-30° C) Maximum: 220° F (105° C)
Approvals -	CSA Class II Div 1 Groups E, F and G (USA & Canada)

ADB29V3C - PT100 / RTD Sensors

Resistance at 77° F -	109.73 Ohms
Resistance at 140° F -	123.24 Ohms
Resistance at 194° F -	134.70 Ohms
Temp. Coefficient -	3850 PPM/K (385)
Sensing Voltage -	5 to 24 VDC
Current Draw -	1 mA (Max. Recommended)
Maximum Power	1 mW
Body Housing -	304 Stainless Steel
Fixing Thread -	1/8" NPT
Cable -	9 ft. (3 m) - 4 Conductor
Operating Temp. -	Minimum: -22° F (-30° C) Maximum: 220° F (105° C)
Approvals -	CSA Class II Div 1 Groups E, F and G (USA & Canada)

DIMENSIONS



⚠WARNING

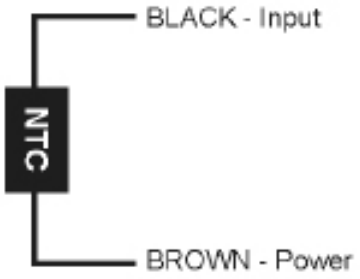
- Rotating machinery can cause serious injury or death
- Always lockout and tagout the machine prior to installation

STANDARD WIRING DIAGRAM

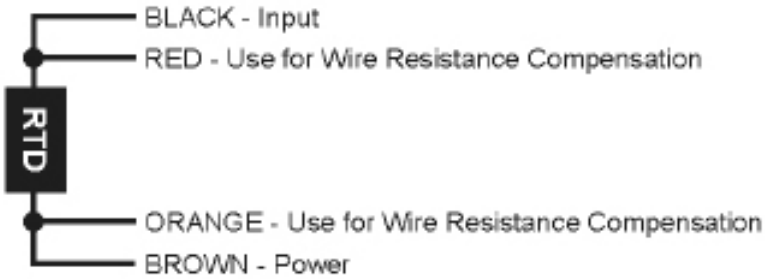
All wiring must be In accordance with local and national electrical codes and should be undertaken by an experienced and qualified electrician.

Always use dust/liquid tight flexible metal conduit with approved fittings to protect the sensor cables. Use rigid metal conduit to protect the cables from the sensors to the control unit. Conduit systems can channel water due to ingress and condensation directly to sensors and sensor connections which over time will adversely affect the performance of the system. As such, the installation of low point conduit drains is recommended for all sensors.

All ADB sensors are non-polarity sensitive, however 4B recommends wiring the sensors as outlined below. For PT100 - RTD sensors, the resistance compensation wire used will be dependent on the application. For example some PLC's may require three wires, others may use all four.



NTC WIRING



PT100 - RTD WIRING

⚠WARNING

Do not wire the sensor across the voltage source directly. Always ensure that the sensor is wired into a signal conditioning circuit for the temperature measurement. Please note that if the power applied across the sensor exceeds the specified maximum rated power or current, then the sensor may be damaged beyond repair. When properly wired to 4B controllers, the power rating across the sensors is kept at a safe level.

INSTALLATION

1. Remove the existing grease zerk from the bearing housing.
2. Loosen the ADB probe nut and remove the sensor probe.
3. Screw the ADB sensor body in to the 1/8" NPT threaded hole in the bearing housing.
4. Re-insert the temperature probe into sensor body, and adjust the probe depth to suit the bearing. For optimum temperature monitoring, the probe should be as close to the outer race as possible without touching (Figures A and B).
5. Tighten the ADB probe nut using the recommended wrench (ADBW). The maximum recommended torque for the probe nut is 18 in lb (2 Nm).
6. It is important to use liquid tight flexible conduit and fittings for the installation (Figures C and D) to protect the sensor cables.

ADB Probe Wrench (ADBW)

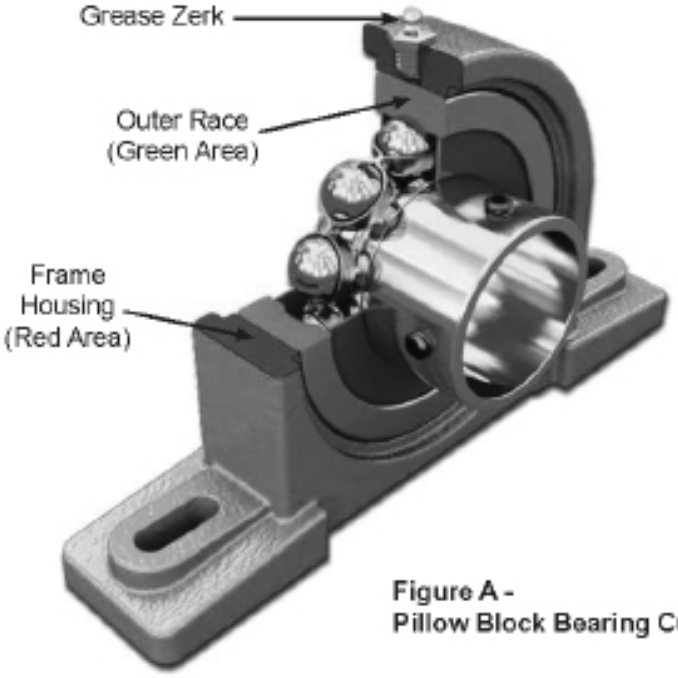


Figure A -
Pillow Block Bearing Cutaway

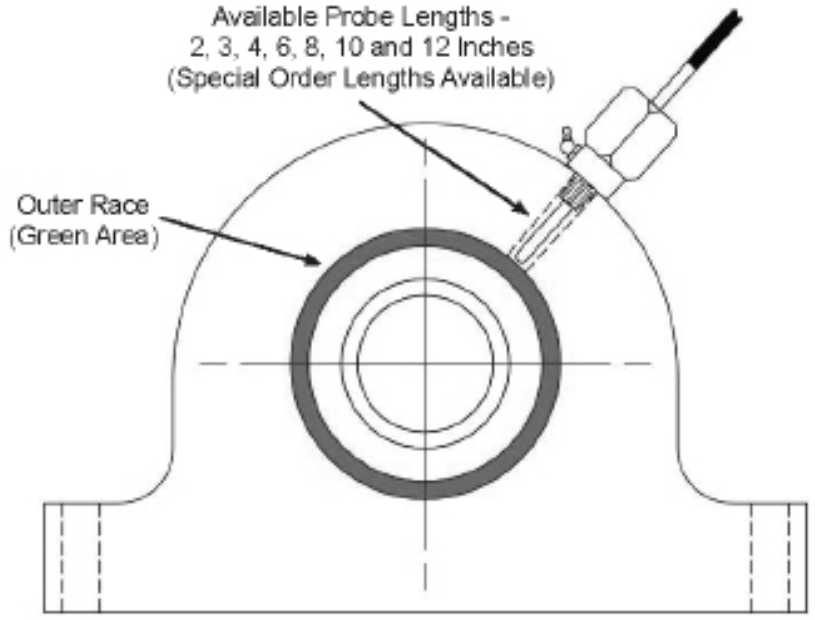


Figure B -
ADB Sensor Installation

LIQUID TIGHT FLEXIBLE CONDUIT INSTALLATION -

Conduit systems can channel water directly to sensors from incorrectly sealed fittings and condensation. Over time, water will adversely affect sensor performance. To prevent this type of damage, it is important to properly install conduit and low point conduit drains. Use rigid metal conduit to protect the cables from the sensors to the control unit.

Figure C illustrates the correct installation of liquid tight flexible conduit. Notice that the bearing sensor is above the conduit drain and the water level.

Figure D shows that water, particularly condensation, can bypass the conduit drain and flow directly into the sensor.

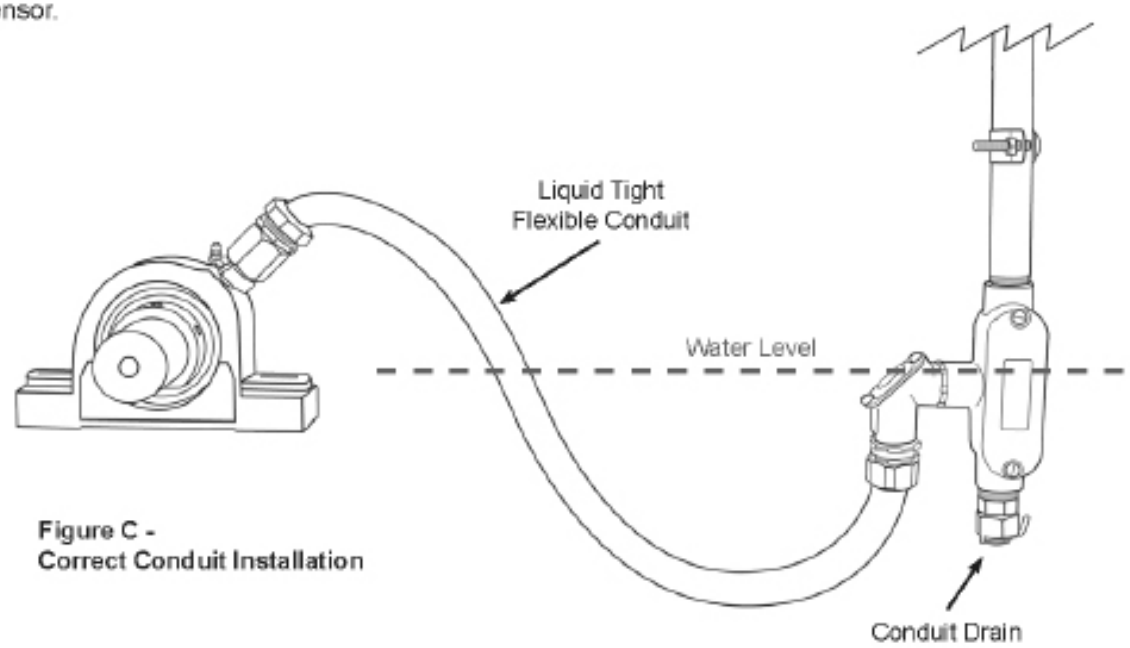


Figure C -
Correct Conduit Installation

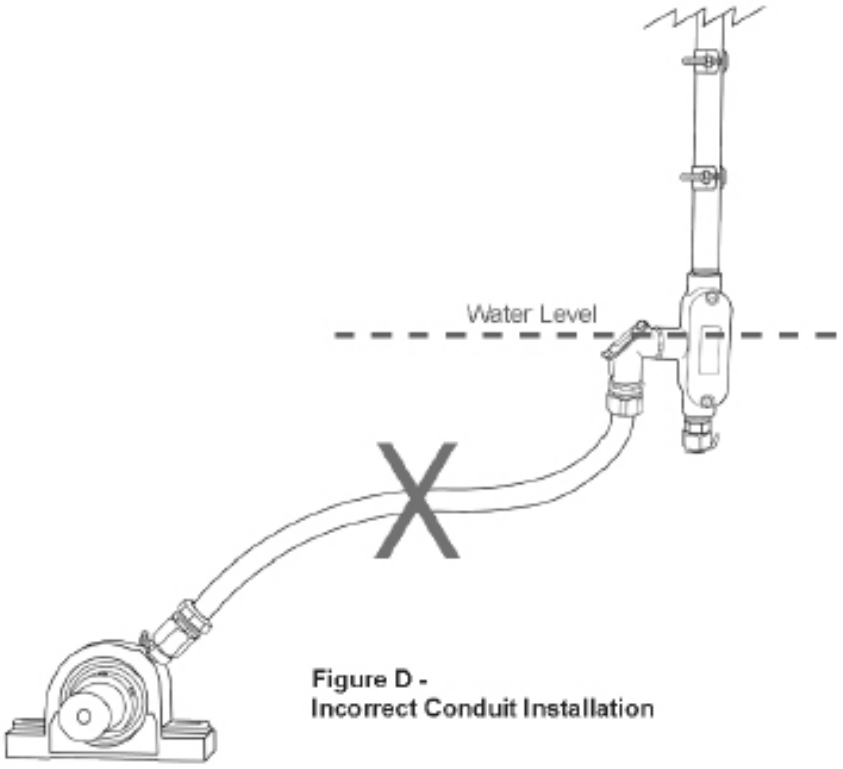


Figure D -
Incorrect Conduit Installation

⚠WARNING

- Rotating machinery can cause serious injury or death
- Always lockout and tagout the machine prior to installation

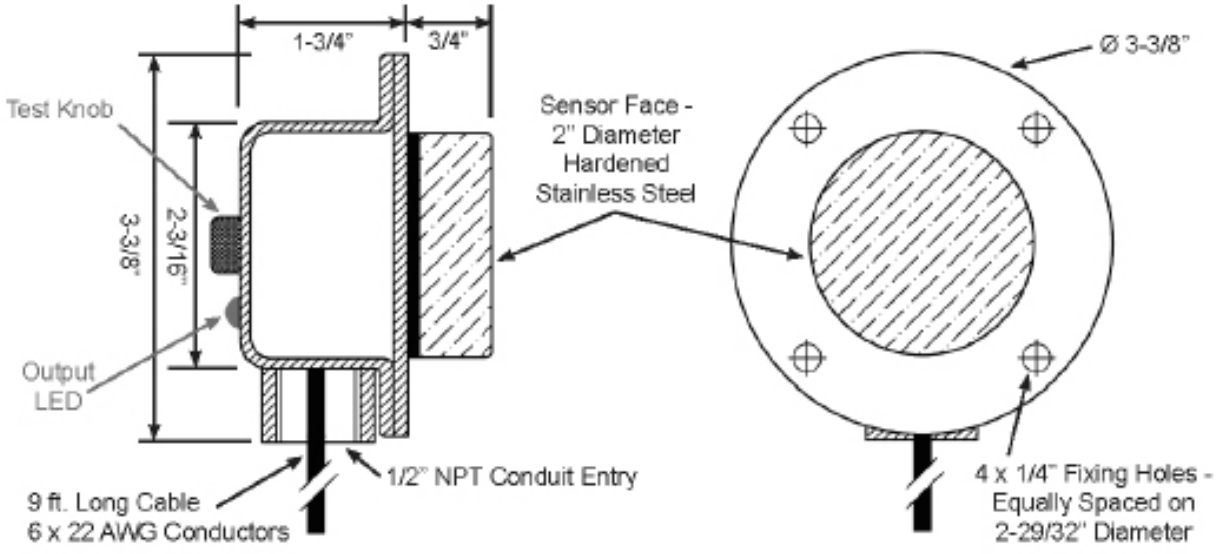
PRODUCT OVERVIEW

The Touchswitch™ is an electronic limit switch. When a belt misaligns or a pulley moves over and contacts the sensor, the built in solid-state electronic circuitry detects the lateral force of the belt or pulley and activates a voltage free relay contact. This relay contact is used to immediately alarm and shutdown the machine. The face of the sensor is made from hardened stainless steel, so that there is virtually no wear when a belt contacts it. The sensor is not affected by dust or material build up and will still work when completely covered by material. Sensors are normally installed in pairs on opposite sides of the machine. Usually a pair of sensors at each pulley is used, but additional pairs can be installed as required. An external test knob allows for quick and simple sensor / system testing.

SPECIFICATIONS

Supply -	24 VDC (TS2V4C) / 12 VDC (TS2V3C)
Power Consumption -	50 mA (TS2V4C) / 60 mA (TS2V3C)
LED Indication -	Red LED indicates unit is powered up and relay is energized
Sensing Force -	Factory set to 8 lb. (3.6 Kg) approximately
Output -	Voltage free changeover relay contact rated at 5A - 250 VAC, non-inductive
Construction -	Hardened stainless steel (face) and seamless steel with epoxy paint (body)
Conduit Entry -	1/2" NPT
Cable -	9 ft. long (3 m) - 6 x 22 AWG Conductors
Weight -	3 lbs.
Protection -	NEMA 4X, IP66
Approvals -	CSA Class II Div 1 Group E, F, and G (USA & Canada) GOST-R Ex tD A20 IP66 T120°C (Russia) ATEX and CE (Versions Available)

DIMENSIONS



⚠WARNING

- Touchswitch™ wiring is low voltage DC.
- Use shielded cable and keep separate from high voltage cable.
- Never run Touchswitch™ cables in the same conduit as 3-phase motor cables.
- Track belts and commission plant prior to installing Touchswitches.
- Fabricated brackets must be built rigid enough to take pressure from a misaligned belt.

NOTE

Install Touchswitches on machinery only after they have been wired to a power source, and can alarm / shutdown the equipment being monitored.

STANDARD WIRING

All wiring must be In accordance with local and national electrical codes and should be undertaken by an experienced and qualified electrician.

Always use dust/liquid tight flexible metal conduit with approved fittings to protect the sensor cables. Use rigid metal conduit to protect the cables from the sensors to the control unit. Conduit systems can channel water due to ingress and condensation directly to sensors and sensor connections which over time will adversely affect the performance of the system. As such, the installation of low point conduit drains is recommended for all sensors.

Mount a suitable junction box within 9 ft. of the sensor, and using a suitable conduit to protect the cables, make the necessary wiring connections inside this junction box. A 9 foot PVC coated cable connected to the sensor contains the following 22 AWG wires:

RED -	24 VDC (TS2V4C) or 12 VDC (TS2V3C)
BLACK -	0 VDC
GREEN -	Ground
WHITE -	Relay Common Connection
BLUE -	Relay Contact, Normally Open (Sensor Output)
ORANGE -	Relay Contact, Normally Closed (Not Normally Used)

NOTE

The orange wire is not normally used and should be cut back and insulated.

SENSOR OPERATION:

The Touchswitch™ is an electronic limit switch that reacts when pressure is applied to the sensor face. If the pressure exceeds 8 lbs. (3.6 kg), the sensor relay goes into an alarm condition (Illustration D). Illustration C denotes normal running conditions, with no pressure applied.

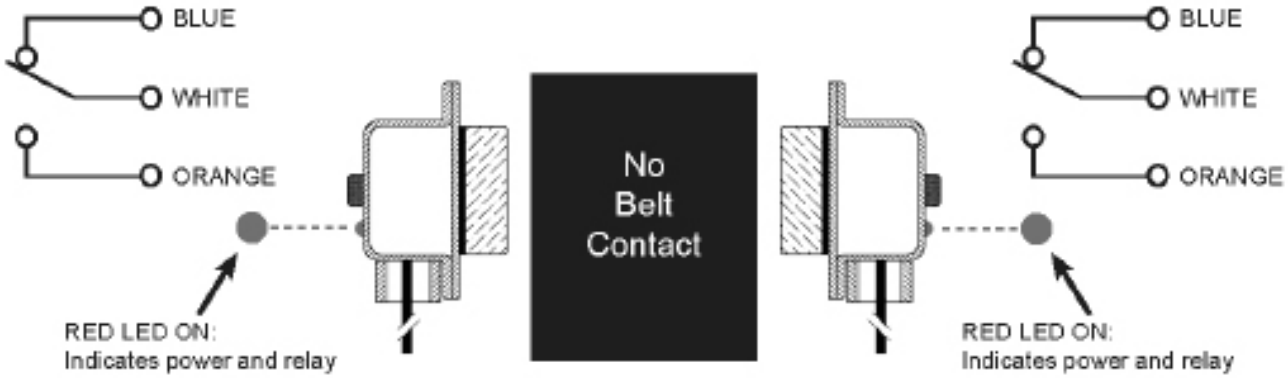


Illustration C
Normal Running Condition

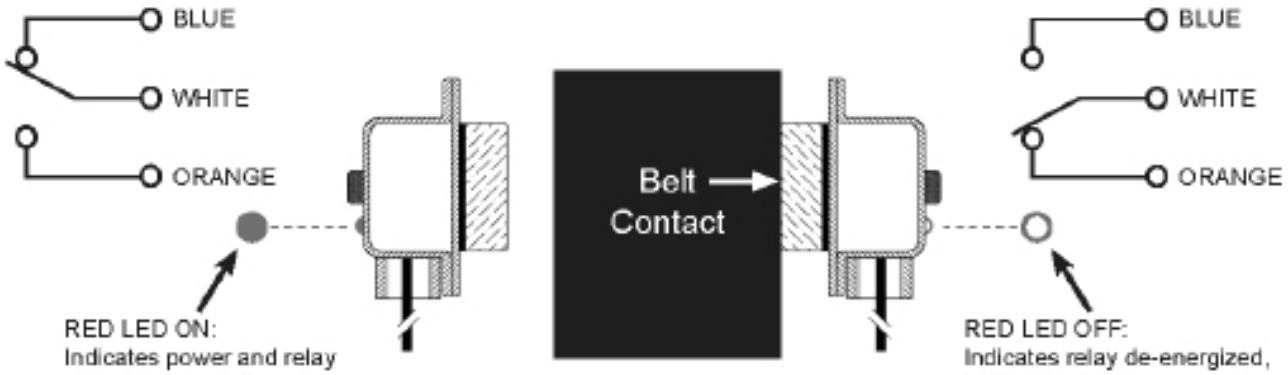


Illustration D
Alarm Condition, Belt Misaligned to the Right

NOTE

- The Touchswitch is factory pre-calibrated and no sensitivity adjustment is necessary. The sensor is calibrated to switch to the alarm state when belt lateral force exceeds 8 lbs. (3.6 kg).
- The Touchswitch contains a non-replaceable permanent 160 mA fuse and a thermal fuse set at 163° F (73° C).
- 4B recommends that the machine shuts down when the belt contacts the Touchswitch. If the machine does not shut down and the belt is allowed to continue to rub against the face of the Touchswitch, the hardened stainless steel sensor puck may wear and the heat generated by the friction may cause the thermal fuse to blow. This fuse is non-replaceable and non-repairable.

TESTING & COMMISSIONING

Periodically test the sensor and the system to ensure both are operating correctly.

The Touchswitch™ has a built in test knob that allows for quick and easy operation verification without removing the sensor from the mounting hole. The testing procedure is outlined below:

1. Observe that the red output LED on the sensor housing is on and the belt or pulley is not touching the sensor.
2. Slowly turn the test knob clockwise by hand, until the LED goes out.
3. Check that the alarm and shutdown procedures work as expected.
   a. If OK, continue to step 4.
   b. If the system does not immediately shutdown as expected or alarm as required, then remove the machine from service until the problem has been diagnosed and corrected.
4. Turn the test knob back to its original position (about 1/4 turn). Make sure that the knob is loose, meaning not turned all the way to the left or right.
5. Observe that the LED is now on, indicating the sensor has power and is not in alarm.

As part of your ongoing maintenance program, periodically test the sensor and system, and visually inspect the contact surface of the sensor and the sealtite, the wires, junction box and conduit.

⚠WARNING

If the system does not immediately shutdown as expected or alarm as required, then remove the machine from service until the problem has been diagnosed and corrected.

TROUBLESHOOTING GUIDE

FAULT	CAUSE	REMEDY
Touchswitch™ Signalling an Alarm Condition and / or Red Output LED is Off	Belt Misaligning	• Check Belt Alignment
	Touchswitch™ Binding Against Leg Casing	• Check Hole Diameter is 2-1/4 Inches and is De-burred • Check Touchswitch™ is Centered in the Hole
	Test Knob Active	• Loosen Knob (Rotate Counterclockwise 1/4 Turn Until Loose)
	No Power	• Check that the Touchswitch™ has the Correct Voltage Supply (24 VDC - TS2V4C or 12 VDC - TS2V3C) • Check Orange Wire is Insulated

⚠WARNING

Always lockout and tagout machinery prior to installation

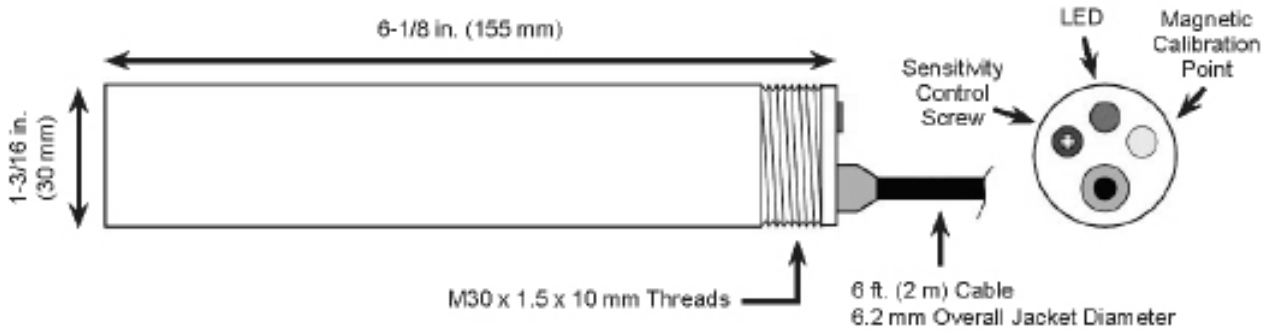
PRODUCT OVERVIEW

The Binswitch Elite sensor detects level or plug situations for bulk granular solids or liquids in tanks, bins, or silos and can be used as a plug or choke detector in chutes, conveyors and elevator legs. The sensor is fully encapsulated in a 30 mm diameter nylon body that is corrosion and abrasion resistant, dust-tight and waterproof. The Binswitch Elite operates by detecting capacitance change when material is present. A user selectable relay output can be magnetically calibrated to be normally energized or de-energized, and during calibration the sensor automatically compensates for material build up, shields or attached metal probes.

SPECIFICATIONS

Model Power Supply -	BSE1V10C - 24 to 240 VAC or 12 to 240 VDC BSE2V10C - 24 to 240 VAC/VDC (universal supply)
Operating Temperature -	-13°F (-25°C) to 158°F (70°C)
Sensing Range -	1 inch (25 mm) maximum
Output Modes -	BSE1V10C - Energized: output on (N/O and common contacts closed) De-energized: output off (N/C and common contacts closed) BSE2V10C - Energized: output on (5.2V drop maximum) De-energized: output off (< 1mA leakage maximum)
Output -	BSE1V10C - Relay rated 240 VAC 3A maximum BSE2V10C - FET rated 200 mA maximum
Calibration Controls -	1. Sensitivity control screw (bin must be empty when calibrating) 2. Magnetic calibration point (bin must be empty when calibrating)
Red LED Indication -	On - normally energized (see sensor calibration for details)
Cable -	BSE1V10C - 6 ft. (2 m) 5 wire BSE2V10C - 6 ft. (2 m) 2 wire
Enclosure -	Nylon
Protection -	IP65
Approvals -	CSA Class II Division 1 Groups E, F and G (USA & Canada) ATEX & CE Versions Available (Europe)

DIMENSIONS



INSTALLATION

The Binswitch Elite may be mounted horizontally or vertically. 4B offers two mounts, SMP or the BMPG36 (see illustrations below). The end of the sensor must be at least one inch from the bin wall or other metalwork.

It is important that the Binswitch is not located in the direct flow path of any abrasive material. However, if the Binswitch must be located in the path of an abrasive material, use in conjunction with the BAS (Binswitch Abrasion Shield).

Three alternative mounting methods are available for the Binswitch Elite, see figures A, B and C below:

Fig. A -

Cut and drill holes as shown and attach mounting plate (SMP) using six 5/16" x 3/4" (M8 x 20) bolts, nuts and washers. Slide Binswitch into position and secure by tightening mounting plate adaptor (BMPA).

DO NOT OVERTIGHTEN

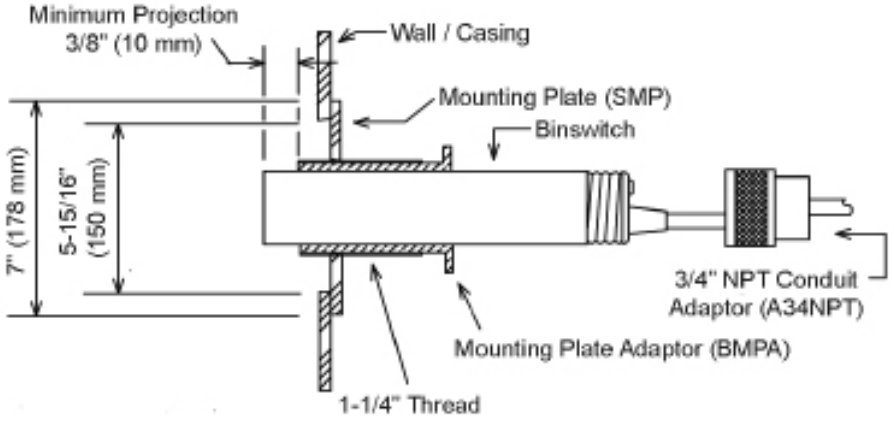


Fig. B -

Cut holes as shown and attach mounting gland (BMPG36) using locknut. Slide binswitch into position and secure with clamp.

DO NOT OVERTIGHTEN

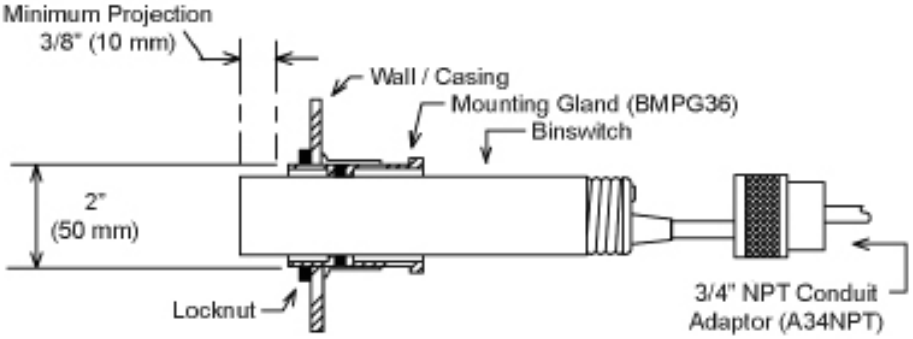
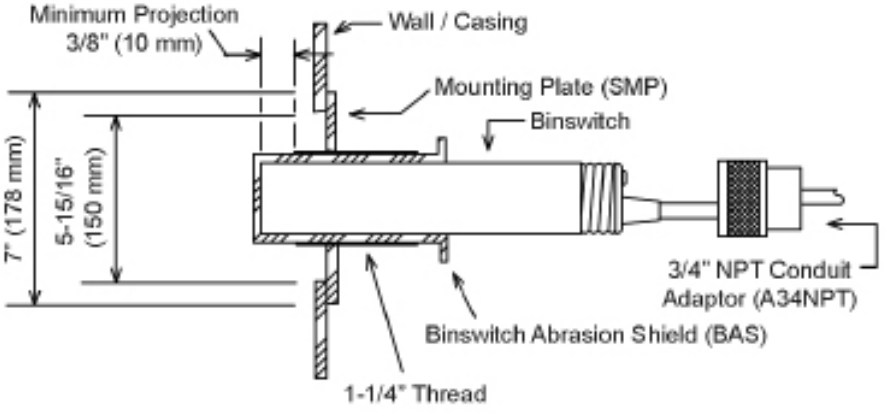


Fig. C -

Cut and drill holes as shown. Attach mounting plate (SMP) using six 5/16" x 3/4" (M8 x 20) bolts, nuts and washers. Slide Binswitch into abrasion shield (BAS) and tighten BAS into mounting plate (SMP).

DO NOT OVERTIGHTEN



WIRING DIAGRAMS

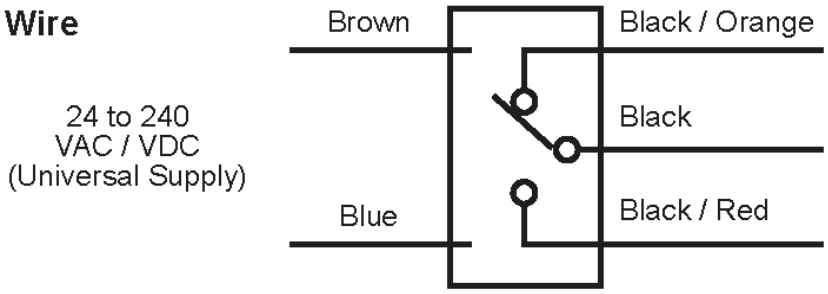
All wiring must be In accordance with local and national electrical codes and should be undertaken by an experienced and qualified electrician.

Always use dust/liquid tight flexible metal conduit with approved fittings to protect the sensor cables. Use rigid metal conduit to protect the cables from the sensors to the control unit. Conduit systems can channel water due to ingress and condensation directly to sensors and sensor connections which over time will adversely affect the performance of the system. As such, the installation of low point conduit drains is recommended for all sensors.

NOTE

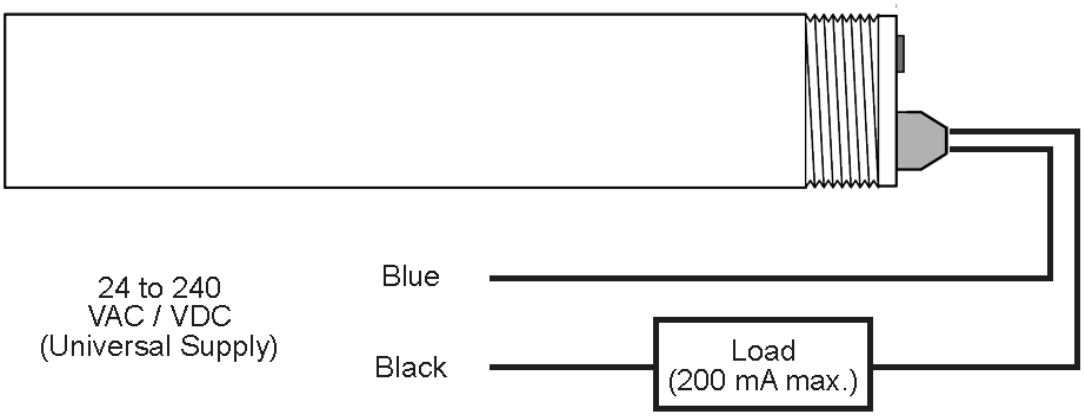
Supply polarity is not important. However for the BSE2V10C (2 wire), the sensors load *MUST* have the same voltage rating as the supply being used and may be connected to either lead. *DO NOT* connect to supply without a suitable load.

BSE1V10C - 5 Wire



Shown In De-Energized State

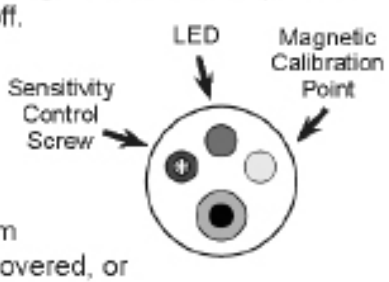
BSE2V10C - 2 Wire



Load & Supply Must Have Same Voltage Rating

SENSOR CALIBRATION

1. The unit must be installed before calibration takes place. Connect the Binswitch to power and a suitable control unit
2. Check that the tip of the Binswitch is not covered or obstructed.
3. Carefully turn the calibration control screw fully counter clockwise to set the sensor sensitivity to zero. Do not use excessive force, the control has end stops.
4. A magnet is taped to the wire of the sensor. Place the magnet on the magnetic calibration point on the end of the sensor (see illustration), the red LED will flash on and off.
   - If a NORMALLY ENERGIZED sensor is required (with no material present), remove the magnet while the LED is "ON".
   - If a NORMALLY DE-ENERGIZED sensor is required (with no material present), remove the magnet when the LED is "OFF".



5. Wait approximately one minute for the automatic compensation system to stabilize. Then either fill the vessel until the tip of the Binswitch is covered, or remove the Binswitch and place the tip of the sensor in a bucket filled with the material to be monitored and then calibrate the unit as follows:
   - NORMALLY ENERGIZED - Slowly turn the sensitivity control screw clockwise until the LED turns "OFF". To set the sensor sensitivity to the optimum setting, turn the control screw an additional ten degrees clockwise.
   - NORMALLY DE-ENERGIZED - Slowly turn the sensitivity control screw clockwise until the LED turns "ON". To set the sensor sensitivity to the optimum setting, turn the control screw an additional ten degrees clockwise.

Turning the sensitivity control screw counter clockwise decreases the sensitivity, turning clockwise increases the sensitivity.

NOTE

If the material being monitored creates dust, you may need to re-calibrate the sensor. Dust build up on the Binswitch will affect the initial calibration. *DO NOT* remove the Binswitch and clean off the dust. *Always check that the Binswitch detects material after the sensitivity has been adjusted.*

TESTING AND COMMISSIONING

1. Check that the unit is correctly installed (see standard wiring diagram).
2. After going through the sensor calibration steps, the red LED should be "ON" if calibrated to be NORMALLY ENERGIZED or "OFF" if NORMALLY DE-ENERGIZED.
3. Introduce material to the Binswitch. If calibrated correctly, the Binswitch will activate when material has been detected. Machinery shut down will depend on your specific monitoring setup. 4B recommends an instant shutdown when maximum fill level or a plug condition has been detected.

⚠WARNING

If the system does not immediately shutdown as expected or alarm as required, then remove the machine from service until the problem has been diagnosed and corrected.

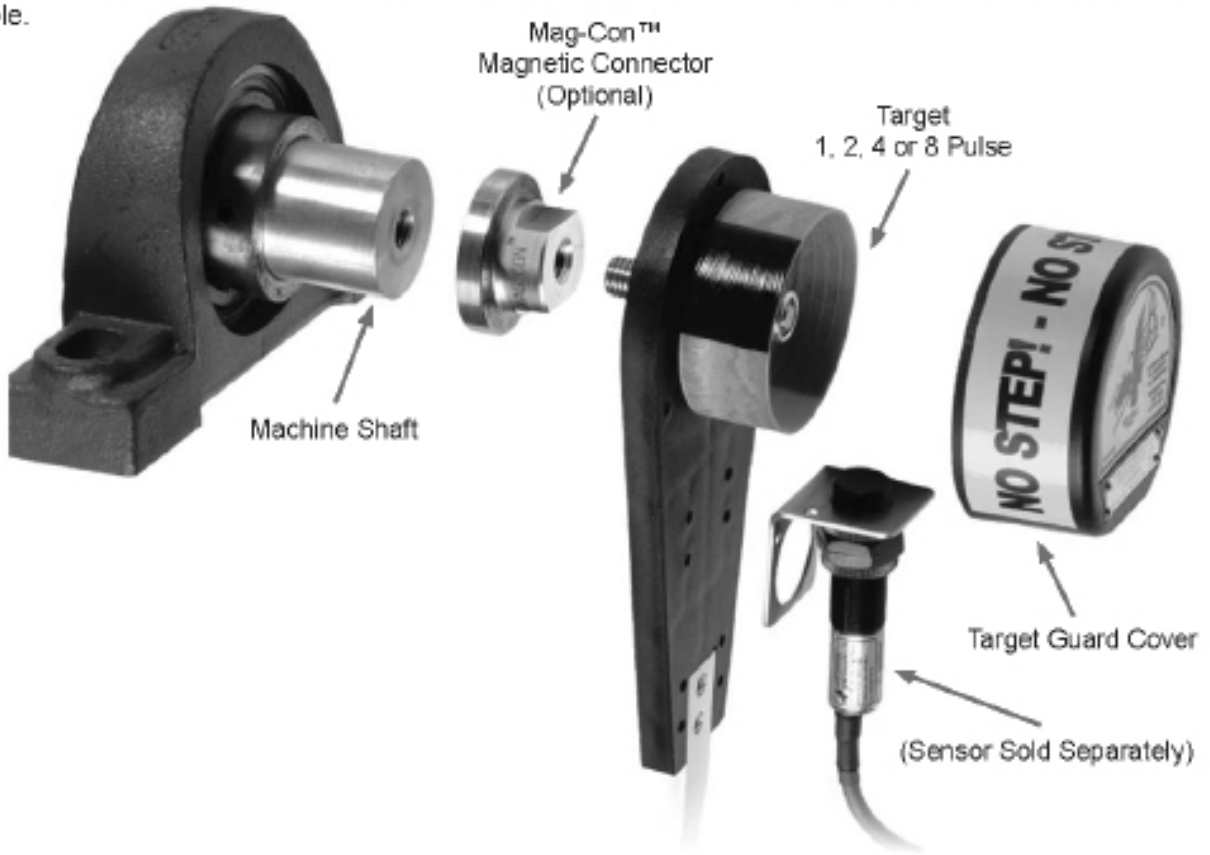
⚠WARNING

- Rotating machinery can cause serious injury or death
- Always lockout and tagout the machine prior to installation

PRODUCT OVERVIEW

The Whirligig® is a fully guarded target for easy mounting of motion sensors. It is a target, bracket and guard suitable for all industry standard cylindrical or DIN style inductive sensors including 4B's M100, M300, M800 Elite and Milli-Speed switches or P100, P300 and P800 proximity sensors.

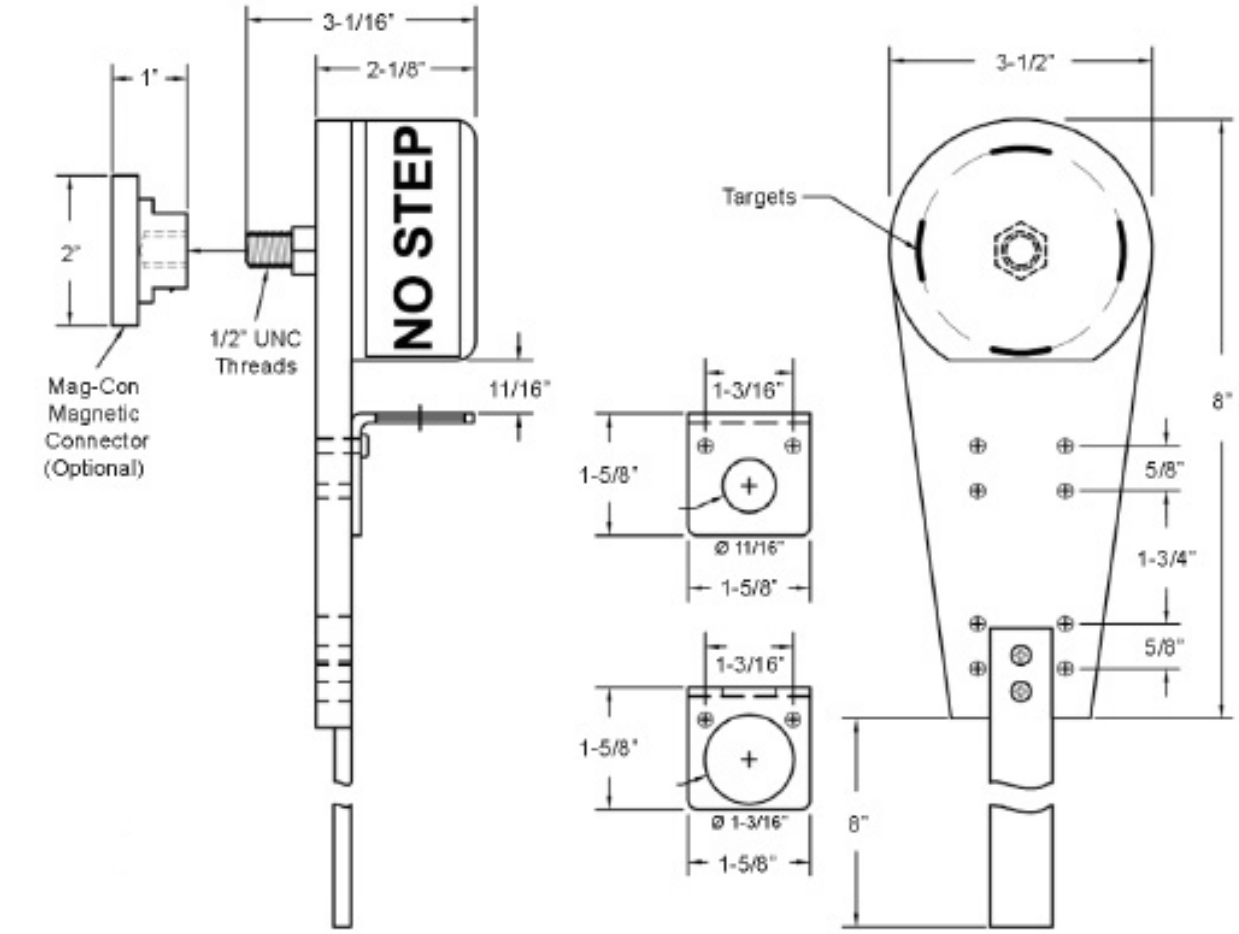
Sensors (sold separately) bolt to the Whirligig® and the complete assembly either bolts to the machines shaft through a 1/2" UNC tapped hole, or is connected magnetically using 4B's patented Mag-Con™ adaptor. Shaft or machine vibration does not affect the performance of the sensor, as the whole assembly moves with the shaft. With the Whirligig, installation of speed sensors is now simple, safe and reliable.

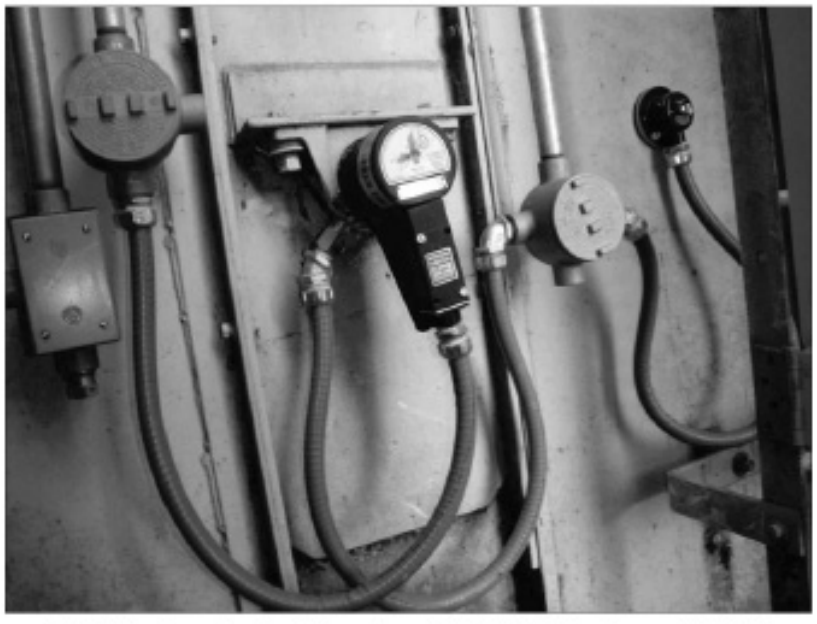


SPECIFICATIONS

Shaft Material -	Stainless Steel
Body Material -	Polypropylene
Bearing -	Sealed Stainless Steel
Thread Size -	1/2" UNC
Hex Wrench Size -	5/8"
Maximum Speed -	1,500 RPM
Pulses / Targets -	1, 2, 4 or 8 (Must Specify)

DIMENSIONS





Whirligig® on Bucket Elevator with M800 Elite Speed Switch

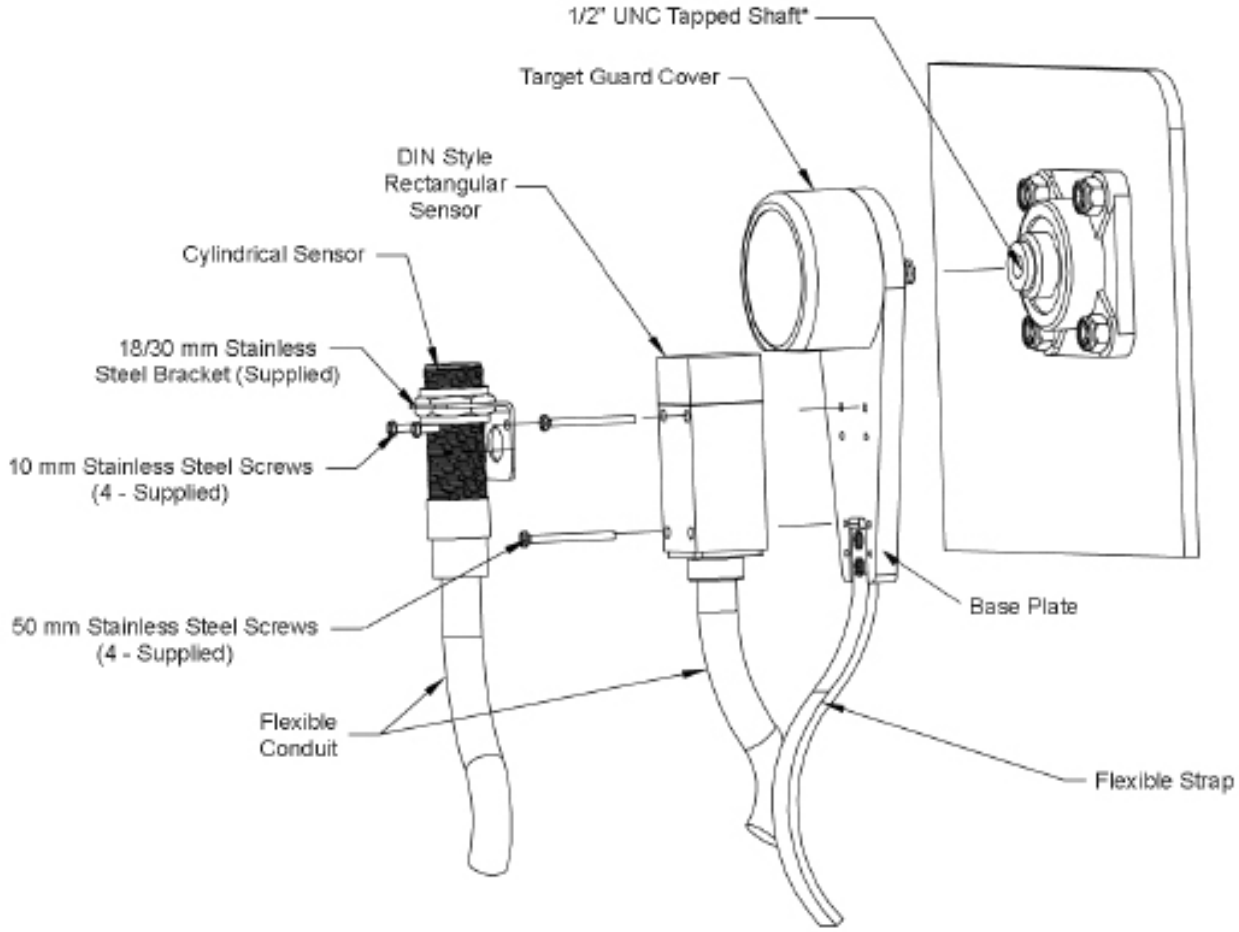
⚠WARNING

O.S.H.A. requires that all exposed rotating shafts are provided with a full guard. Therefore, this device and its target must be equipped with a guard.

INSTALLATION

Do *NOT* remove the Whirligig® target guard cover. The rotating components under the cover could cause serious injury.

1. There are two options to attach the Whirligig® to the machine's shaft:
   Option A - Use Mag-Con™ magnetic connector. Thread the Mag-Con™ onto the Whirligig® using a thread locking adhesive (Loctite or similar) and attach the unit onto the machine shaft.
   Option B - Drill and tap the center of the machine shaft for 1/2" UNC thread, ensure that the shaft is tapped 1" deep. Thread the Whirligig® onto the machine shaft with a 5/8" open ended wrench using suitable thread locking adhesive (Loctite or similar).
2. Fix the white flexible strap to the bottom of the Whirligig® base plate using the supplied screws.
3. Install the sensor to the base plate, leave a 2 mm (approximate) gap between the sensor face and the target guard cover. Two sets of pre-drilled holes are provided for DIN style rectangular sensors. For 18 or 30 mm cylindrical sensors, use the supplied universal stainless steel bracket and screws.
4. Wire the sensor in accordance with the manufacturer's instructions while observing all relevant electrical and OSHA regulations.
5. Fix the white flexible strap to the static structure (if required).



**No need to drill and tap 1/2" UNC hole in shaft if using the optional Mag-Con™ Magnetic Connector*

OPEN CONVEYOR EMERGENCY PULL CORD SAFETY STOP SWITCH

⚠WARNING

Always lockout and tagout the machine prior to installation, and follow all other safety procedures.

PRODUCT OVERVIEW

The Pullswitch is a fail-safe taut wire emergency pull cord safety stop switch for open conveyors.

PVC coated steel pull wire and pigtails connect between the switches to provide easy installation and continuous emergency stop access along the length of the entire conveyor. The unique open curled design of the pigtail allows the pull wire to be installed or removed without disconnecting the entire assembly. Pullswitches can be installed at 200 ft. intervals, reducing overall system cost. Quick location of a tripped switch is provided by a cat's eye reflector or optional flag indicator, and the tripped signal can be wired back to the motor starter and an alarm panel or PLC.

The Pullswitch is a taut wire device, so if wire tension is lost the unit will trip. This design provides a secondary level of safety protection if the pull wire is damaged, or becomes slack.

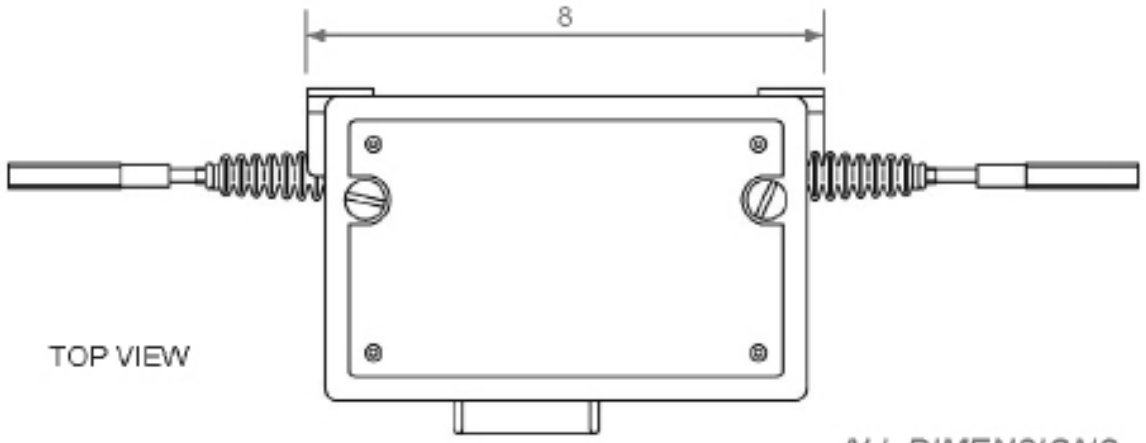
The Pullswitch has an IP65 / NEMA 4, 4X, 9 rated enclosure made from polycarbonate with stainless steel plates, making the housing corrosion resistant and weatherproof. A total of six independent changeover contacts inside the Pullswitch offer flexible operation and control. Two independent cam operated switches with snap action mechanical operation are provided for conveyor shutdown, and four additional micro-switches signal a slack wire alarm.

SPECIFICATIONS

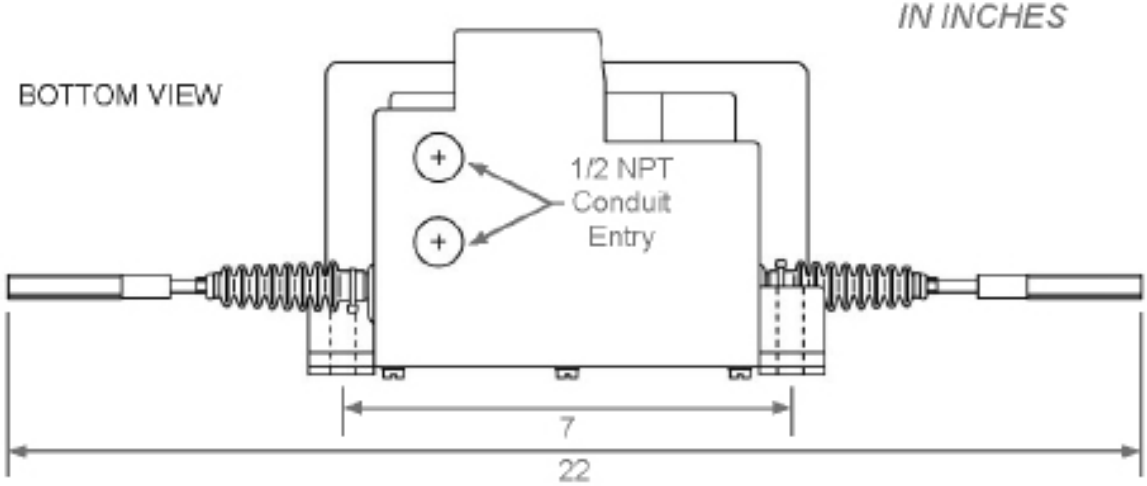
Enclosure -	UV Protected Polycarbonate with Protective 304 Stainless Steel Plates (Top, Back and Bottom)
Mechanism -	Double Ended Taut Wire
Activation Pull Force -	15.5 lbs. / 69 Newtons (Calculated Average)
Pull Wire Deflection -	9.8 in / 250 mm (Calculated Average)
Contacts -	5 Amps (240 VAC)
Conduit Entries -	Two - 1/2" NPT
Operating Temperature -	- 4°F to 131°F (-20°C to 55°C)
Weight -	4 lb. (1.8 kg)
Protection -	IP65 / NEMA 4, 4X, 9
Approvals -	CSA Class II Div 1 Groups E, F and G (USA and Canada)

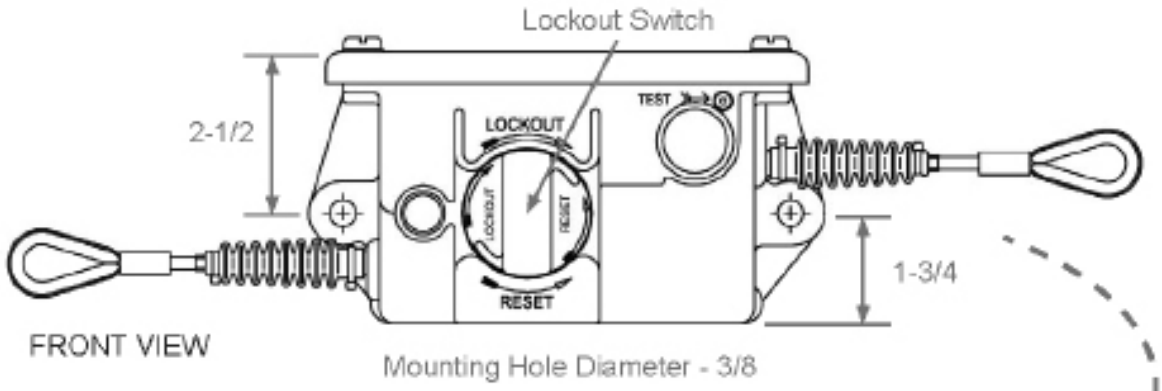
IMAGE A -
Pullswitch Shown with Optional Flag Indicator

DIMENSIONS

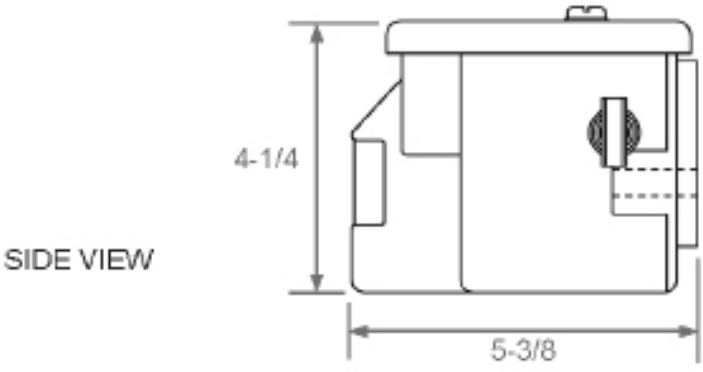


ALL DIMENSIONS IN INCHES





Mounting Hole Diameter - 3/8



TYPICAL CONFIGURATIONS

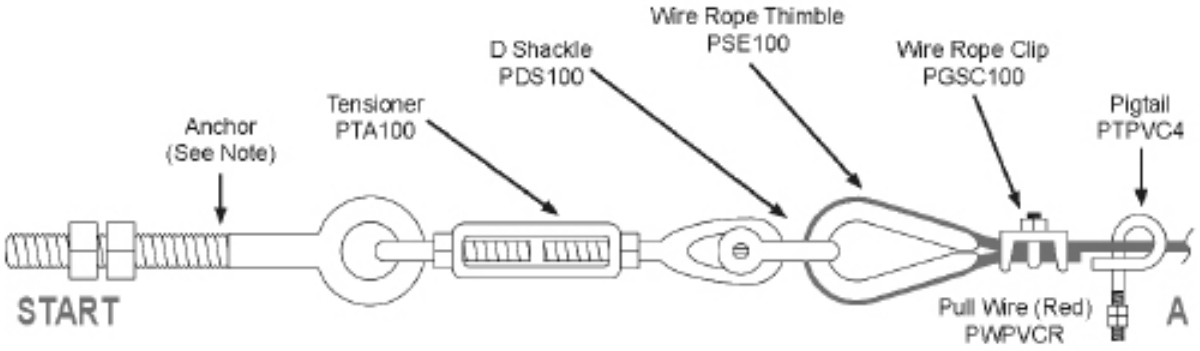


ILLUSTRATION 1 - Start of Pull Wire Configuration

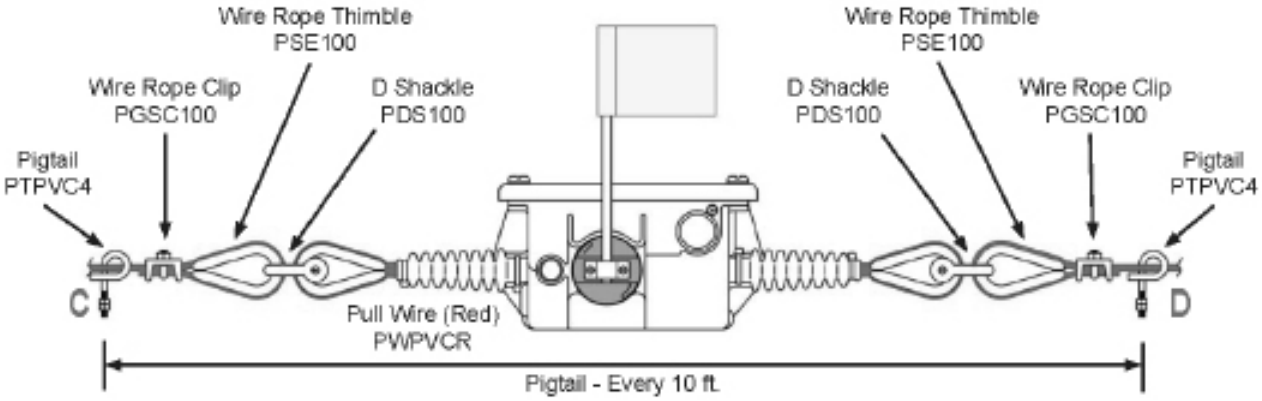


ILLUSTRATION 3 - Configuration for Single Pullswitch

The need for single or double sided installations will depend on your specific application. Some conveyors are not accessible on both sides, so only a one sided installation is needed. However, if your conveyor is accessible on both sides, a two sided installation is required. For double sided installations, 4B recommends mirroring Pullswitch installations on both sides of the conveyor.

Use the illustrations 1 - 4 above as a reference for the installation configurations listed below -

1. Single Pullswitch Installation -
   START - A - C - D - B - END
2. Multiple Pullswitch Installation (2 Pullswitch Configuration) -
   START - A - C - D - E - F - B - END
3. Multiple Pullswitch Installation (3 Pullswitch Configuration) -
   START - A - C - D - E - F - E - F - B - END
   E - F may need to be repeated depending on the length of the conveyor.

For conveyor lengths of 200 feet and under, a single Pullswitch (per side) can be used. For conveyor lengths over 200 feet, multiple Pullswitches will be required.

Illustrations 5 and 6 outline the maximum recommended distances for single and multiple installation configurations. Maximum distances of pull wire start and end points to the Pullswitch is 100 feet. Maximum distance between multiple Pullswitches is 200 feet.

NOTE

More Pullswitch installation diagrams available at - www.go4b.com/pullswitch.

TYPICAL CONFIGURATIONS

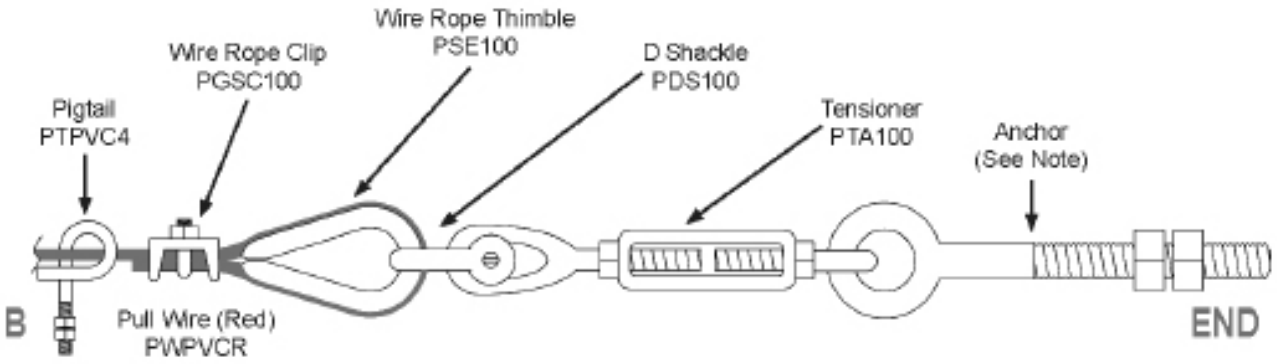


ILLUSTRATION 2 - End of Pull Wire Configuration

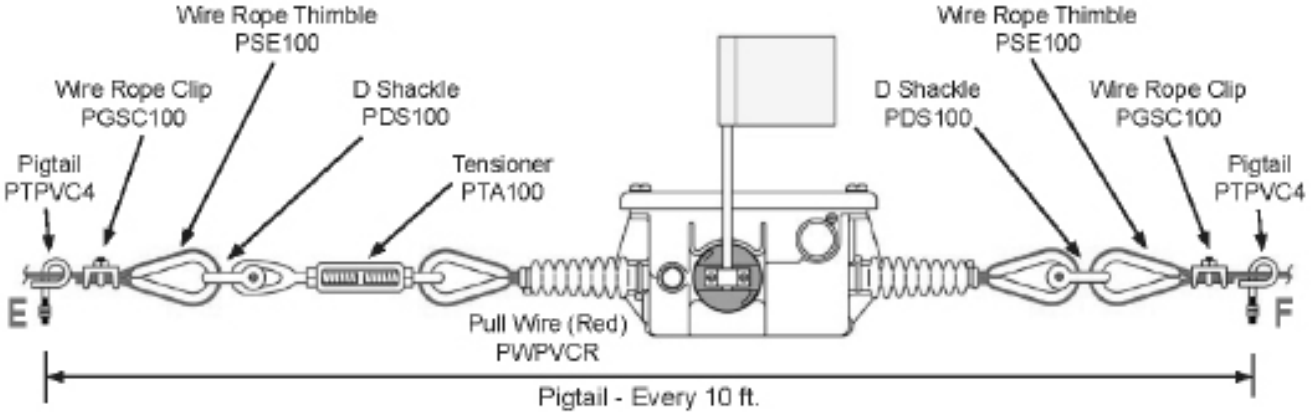


ILLUSTRATION 4 - Multiple Pullswitch Configuration

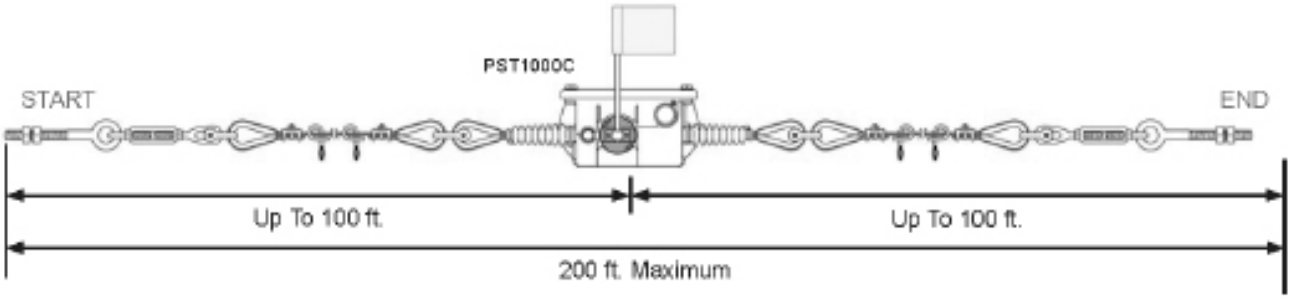


ILLUSTRATION 5 - Single Pullswitch Installation

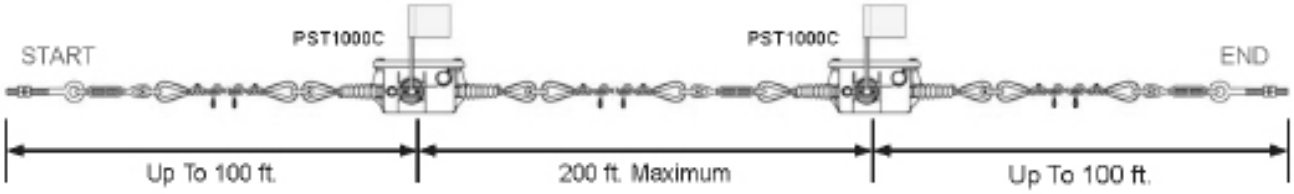


ILLUSTRATION 6 - Multiple Pullswitch Installation

NOTE

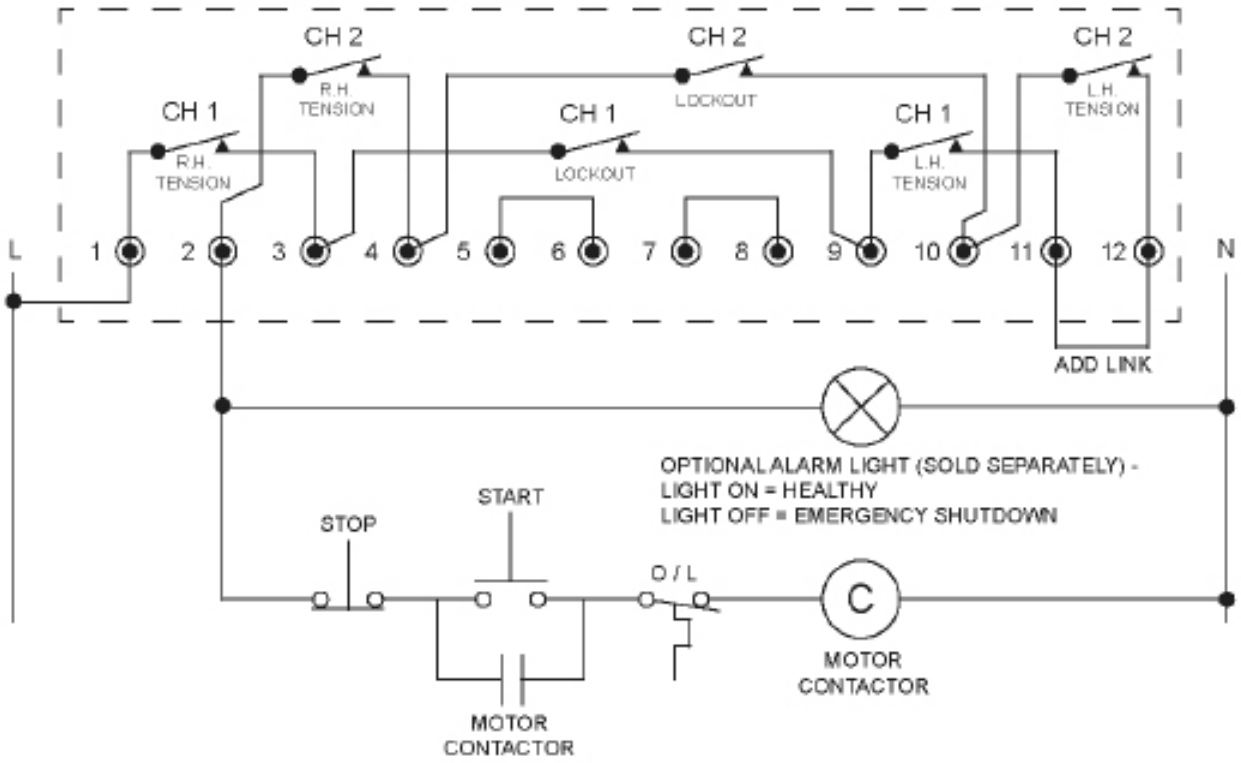
- Install a Pigtail (PTPVC4) every 10 feet along the entire length of the conveyor.
- Some regulations may require an anchor spring (PAS100) at the start and end points instead of fixed anchors as illustrated above.

STANDARD WIRING DIAGRAM

All wiring must be In accordance with local and national electrical codes and should be undertaken by an experienced and qualified electrician.

Always use dust/liquid tight flexible metal conduit with approved fittings to protect the sensor cables. Use rigid metal conduit to protect the cables from the sensors to the control unit. Conduit systems can channel water due to ingress and condensation directly to sensors and sensor connections which over time will adversely affect the performance of the system. As such, the installation of low point conduit drains is recommended for all sensors.

Contacts Shown in Normal Operating Condition



NOTE

CH 2 is a backup fail-safe for CH1.

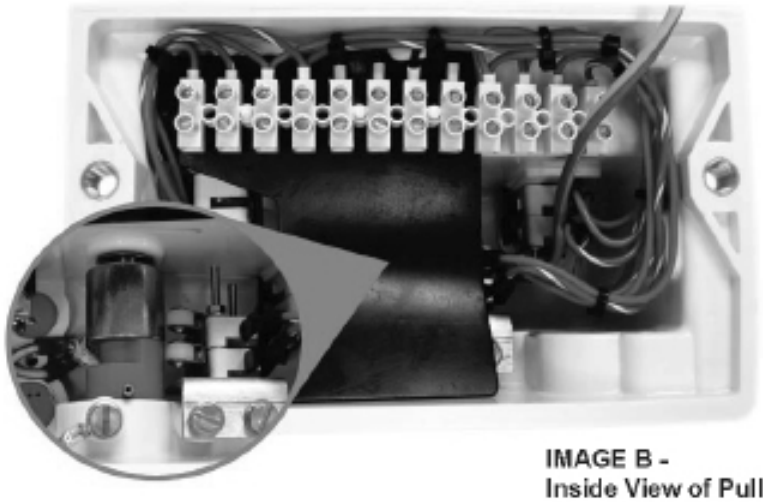


IMAGE B -
Inside View of Pullswitch

INSTALLATION

1. Bolt the Pullswitch onto the conveyor structure by using 3/8 inch bolts. Align the Pullswitch so that the pull wire will run along the length of the conveyor and is easily accessible. If a tripper is being used on the conveyor, be careful to avoid its line of travel. Do not over tighten the 3/8 inch bolts.
2. Remove the top cover of the Pullswitch by removing the two fixing screws.
3. Install 1/2 inch NPT dust/liquid tight flexible metal conduit through the bottom of the Pullswitch. Use 1/2 inch NPT plugs on any conduit entry that will not be used.
4. After pulling the incoming and outgoing electrical cables, wire the terminals according to the STANDARD WIRING DIAGRAM on page 10.
5. Make sure that the electrical cables are cut to minimum lengths.
6. Fit pull wire and support guides (pigtails or eyebolts) along the length of the system. Detailed configuration diagrams can be found on pages 8 - 9. For double sided installations, 4B recommends mirroring the installation on both sides of the conveyor.
7. Use cable tensioners at each end and between multiple Pullswitches.
8. The Pullswitch is a taut wire switch, set the tension of the pull wire by adjusting the cable tensioners until the tension marker is 2-1/2 inches from the side of the pullswitch (Image C)

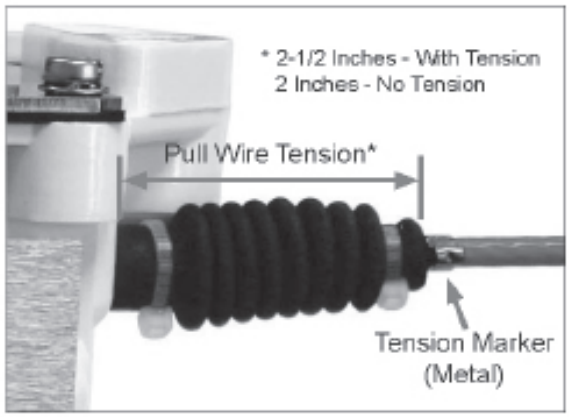


IMAGE C -
Pull Wire Tension Indication

TESTING & COMMISSIONING

Test the system by pulling the pull wire firmly to the full limit of travel or by turning the red lockout switch on the front of the pullswitch clockwise unit it is in the horizontal tripped position. The conveyor should stop immediately.

Reset the system by turning the lockout knob counterclockwise to its original position. If the system does not reset, then check the tension of the cable.

4B recommends inspecting and testing the operation of the system at regular intervals.

⚠WARNING

If the system does not immediately shutdown as expected or alarm as required, then remove the machine from service until the problem has been diagnosed and corrected.

This information has been provided by 4B Components Ltd. Complete manuals are available at www.go4b.com.

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